

VII Workshop on Symplectic and Contact Topology (GESTA 2006)

[About Gesta](#)
[Organization](#)
[Program](#)
[Registration](#)
[Lodging](#)
[Venue](#)
[Sponsors](#)
[Contact](#)

**Universidad
Carlos III de
Madrid**

**Campus at Getafe
(Madrid)**

**August 16-19,
2006**



Here is the [official workshop picture](#).

Last minute informations:

- **Directions from the airport to the conference venue have changed!** Due to summer construction works some crucial subway lines are interrupted. See the updated directions in the [venue page](#), or [our subway map indicating which lines are interrupted](#).
- The [book of abstracts](#) is available.

A satellite conference to the [2006 International Congress of
Mathematicians in Madrid, Spain](#)



Download here [our poster](#).

VII Workshop on Symplectic and Contact Topology

(GESTA 2006)

[About Gesta](#)

[Organization](#)

[Program](#)

[Registration](#)

[Lodging](#)

[Venue](#)

[Sponsors](#)

[Contact](#)

Gesta is an acronym for *Geometría Simpléctica con Técnicas Algebraicas* (Symplectic Geometry with Algebraic Techniques).

It is the name of a Spanish group of mathematicians interested in Symplectic Geometry, Algebraic Geometry and Mathematical Physics. Follow this [link to our previous activities](#).

VII Workshop on Symplectic and Contact Topology

Organization

[About Gesta](#)

[Organization](#)

[Program](#)

[Registration](#)

[Lodging](#)

[Venue](#)

[Sponsors](#)

[Contact](#)

Scientific committee:

Simon Donaldson (Imperial College, London, UK)

Yakov Eliashberg (Stanford University, USA)

Kenji Fukaya (Kyoto University, Japan)

José Manuel F. de Labastida (U. de Santiago de Compostela, Spain)

Robert Gompf (Univ. Of Texas at Austin, USA)

Helmut Hofer (Courant Institute, New York Univ. USA)

Dusa McDuff (Stony Brook University, USA)

Gang Tian (Princeton University, USA)

Organizing committee:

Alberto Ibort (Universidad Carlos III de Madrid) (chairman)

Jaume Amorós (Universitat Politècnica de Catalunya)

Marisa Fernández (Universidad del País Vasco)

David Martínez Torres (Universiteit Utrecht)

Eva Miranda (Université Paul Sabatier, Toulouse)

Ignasi Mundet i Riera (Universitat de Barcelona)

Vicente Muñoz (Consejo Superior de Investigaciones Científicas, Madrid)

Francisco Presas (Consejo Superior de Investigaciones Científicas, Madrid)

Ignacio Sols (Universidad Complutense de Madrid)

Carlos Tejero (Universidad de Salamanca)

VII Workshop on Symplectic and Contact Topology

Program

[About Gesta](#)
[Organization](#)

[Program](#)

[Registration](#)

[Lodging](#)

[Venue](#)

[Sponsors](#)

[Contact](#)

A workshop centered on Symplectic Topology, Contact Topology, Gauge Theory, Low Dimensional Topology and Mirror Symmetry.

Proceedings will be published as a special issue of [Geometriae Dedicata](#).

Almost definitive program (to see title and abstract, follow link on each speaker's name or download our [booklet of abstracts](#)):

	WEDNESDAY 16	THURSDAY 17	FRIDAY 18	SATURDAY 19
8:15-9:00	Registration & opening			
9:00-10:00	D. Auroux	L. Katzarkov	D.H. Phong	G. Mikhalkin
10:00-11:00	B. Siebert	K. Honda	P.S. Ozsvath	T. Mrowka
11:00-11:30	Coffee	Coffee	Coffee	Coffee
11:30-12:00	N.T. Zung	M. Verbitsky	M. Usher	D. McDuff
12:00-12:30	A. Tralle	C. Wendl	B. Weinkove	
12:30-13:00	M. Abouzaid	K. Niederkruger	P. Ghiggini	Closing
13:00-15:00	Lunch break	Lunch break	Lunch break	
15:00-16:00	P. Biran	R. Gompf	Gang Tian	
16:00-16:30	Coffee	Coffee	Coffee	
16:30-17:00	K. Sekigawa	K. Fukaya	S. Finashin	
17:00-17:30	R. Ferreiro		R. Sena-Dias	
17:30-18:00	Y. Mitsumatsu	A. Gobbled	F. Pasquotto	
18:00-18:30	Poster session	T. Etgu	Poster session	
Evening	Reception cocktail		Dinner	

REMARK: The posters will be displayed from the afternoon of Wednesday 16th until the end of the Workshop.

VII Workshop on Symplectic and Contact Topology

Lodging

[About Gesta](#)

[Organization](#)

[Program](#)

[Registration](#)

[Lodging](#)

[Venue](#)

[Sponsors](#)

[Contact](#)

Lodging is handled separately from registration. The most convenient choices for participants are to stay at [the University residence in campus](#), at [a hotel in Getafe](#) (within walking distance of workshop) or at [a hotel in Madrid](#) (with a daily commute of around 30' either way).

The University residence in campus:

The organization has arranged for the participants the possibility to stay at the [residence Fernando de los Ríos](#), operated for Universidad Carlos III and located at the conference campus. This residence is within a few minutes walk from both the conference venue and the downtown's shops and cafés. Its cost is lower than that of a hotel, while its equipment is standard.

If you wish to book a room at the Residence "Fernando de los Rios" during the celebration of the Internacional workshop on "Symplectic and Contact Topology" GESTA 2006, August 16-19, 2006, please: cut and paste this form, fill it up and send it to the e-mail address R.F.delosRios@fund.uc3m.es, mentioning GESTA 2006 in the e-mail subject. A limited number of rooms are on offer.

Surname:.....
First name:.....
Address:.....
E-mail:.....
Arrival date:.....
Leaving date:.....
Single or double room:.....

Cost of the accomodation per person per night (meals not included)

Double room: 23,20 €+ 7% VAT

Single room: 46,40 € + 7% VAT

Meal costs:

Breakfast 1,10 €+ 7% VAT

Lunch 3,60 €+ 7% VAT

Dinner 3,60 €+ 7% VAT

Full board 8,30 €+ 7% VAT

[Get here the lodging form in pdf format.](#)

Hotels in Getafe:

The following hotels in Getafe are well communicated, and within walking distance of both the workshop venue and the downtown area. You may learn more about their

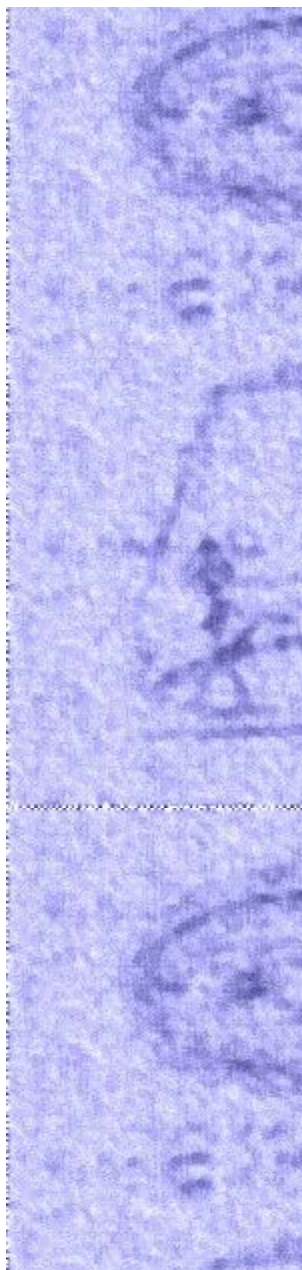
location at [the Getafe street searcher](#). The best rates for rooms seem to be available at online reservation services. We provide as an orientation the rates in Getafe offered by interhotel.com (<http://interhotel.com/spain/en/localidades/1156.html>) booking in May, without any warranty that they are better than those at your favorite reservation system.

- **Hotel Carlos III.** A 3-star hotel by the historic city center (with shops, cafés...), 15 minutes walking from the workshop campus. Its rate for a single room is in the €50-60 per night range. Address: Velasco 7. 28901 Getafe (Madrid). Phone: +34916831392.
- **Hotel Ibis.** A new, large 2-star hotel, at a 10-minute walk from campus and within walking distance of the historic city center. It offers WiFi. Room rates in the €50-60 per night range. Web page http://www.ibishotel.com/ibis/fichehotel/gb/ibi/3559/fiche_hotel.shtml Address: Alcalde Angel Arroyo 8. 28903 Getafe (Madrid). Phone: +34916652760. Fax: +34916650239.
- **Hotel AC Getafe.** Modern, 4-star hotel, 10-15 minutes from both the workshop campus and the city center. Rates for a room in the €60-70 per night range. Web page <http://ac.hotelsearch.com/achotelgetafe/index.html> Address: Ctra. Madrid-Toledo esq. C/ Torroja. 28901 Getafe (Madrid).

Hotels in Madrid:

Lodging in Madrid and commuting daily to the workshop is a reasonable possibility, with frequent connecting trains, a wide timetable, and a 30' commute if your hotel in Madrid is close to the Atocha railway station (in the city center of Madrid) or to the Metro subway to Getafe (see the [directions to the workshop in the Venue page](#)). The cost of each trip is €1.20 to/from Atocha, and €1.50 using the Metro.

If you plan to stay at a hotel provided by the ICM lodging service: hotels in area D (city center of Madrid) have the shortest commute (30'-40'), while hotels in area A (ICM venue, close to the airport) have a commute time of around 1 hour each way.



VII Workshop on Symplectic and Contact Topology

(GESTA 2006)

[About Gesta](#)
[Organization](#)
[Program](#)
[Registration](#)
[Lodging](#)
[Venue](#)
[Sponsors](#)
[Contact](#)



The workshop will be held at the Universidad Carlos III Campus in Getafe, Madrid.

Located 13 km S of Madrid, Getafe has evolved from a medieval town to become the regional center of the aeronautic industry. It is well communicated with Madrid and Toledo by road and train.







[The campus and its neighbourhood: workshop sites.](#)

[How to get to the workshop: connections with Madrid and the airport, coming by car, Getafe.](#)
Beware of **last minute changes in public transport, due to construction works interrupting some lines. Version shown here was updated on Aug. 13.**

[Getting on around Madrid: some links to public transport, tourism, art, food...](#)

The campus and its neighbourhood:

The Universidad Carlos III Getafe campus lies NE of the Getafe city center, about 15 minutes walking distance. The main landmarks in the campus map for workshop participants are:

- the 'Rectorado' building (main workshop site): marked as 
- the Residencia Fernando de los Ríos (workshop residence in the campus): marked as 
- the Renfe railway station (trains to/from Madrid and airport), marked as 
- the Metropolitan railway station (branch of the Madrid subway, also connecting to airport), marked as 






Map reproduced by courtesy of Universidad Carlos III.

How to get to the workshop:

From the airport to Madrid:

Use the Metro subway (), line 8, from the Aeropuerto to the Nuevos Ministerios station in downtown Madrid.

Due to the enlarging works that are being carried by Metro (subway), line 8 is interrupted between the stations of Mar de Cristal and Colombia but there is an alternative free transport by bus between both stations, which will make the journey a bit longer. The way to these buses and the buses themselves are clearly signalled with yellow signs stating "SE" (= Special Service). Depending on your final destination, transfer to line 4 on Mar de Cristal station may be preferable (see the [Madrid Metro railway map, with indication of interrupted lines during August 2006](#)).

From the airport to the workshop venue and lodging in Getafe (by subway + suburban rail, fastest way):

Use the Metro subway, line 8, from Aeropuerto to Nuevos Ministerios station*. Then transfer to the suburban rail (called Cercanías), any line southbound from Nuevos Ministerios to Atocha (lines C-1, C-2, C-7, C-10). In Atocha rail station transfer to line C-4, southbound (towards Parla), and follow it to Las Margaritas-Universidad station, which is in the above campus map. Journey time is about 50 minutes. Metro runs from 6.00 h. (6 a.m.) to 2.00 h. (2 a.m.) daily; last Cercanías train from Atocha leaves at 23.51 h. (11.51 p.m.) daily.

* Due to the enlarging works that are being carried by Metro (subway), line 8 is interrupted between the stations of Mar de Cristal and Colombia but there is an alternative free transport by bus between both stations, which will make the journey a bit longer. The way to these buses and the buses themselves are clearly signalled with yellow signs stating "SE" (= Special Service). Other lines are interrupted too (see [our Metro map indicating interrupted lines](#)).

From the airport to the workshop venue and lodging in Getafe (by subway, simpler transfers):

Use the Metro subway, line 8, from Aeropuerto to the Nuevos Ministerios station*. There transfer to line 10,

southbound, to Puerta del Sur** . In Puerta del Sur transfer to line 12, eastbound, and follow it to Juan de la Cierva station, which is in the above campus map. Journey time is about **1 hour 15 minutes**. Metro runs from 6.00 h. (6 a.m.) to 2.00 h. (2 a.m.) daily.

* Due to the enlargening works that are being carried by Metro (subway), line 8 is interrupted between the stations of Mar de Cristal and Colombia but there is an alternative free transport by bus between both stations, which will make the journey a bit longer. The way to these buses and the buses themselves are clearly signalised with yellow signs stating "SE" (= Special Service). Other lines are interrupted too (see [our Metro map indicating interrupted lines](#)).

** Due to the enlargening works that are being carried by Metro (subway), line 10 is interrupted between the stations of Colonia Jardín and Cuatro Vientos but there is an alternative free transport by bus between both stations, which will make the journey a bit longer. The way to these buses and the buses themselves are clearly signalised with yellow signs stating "SE" (= Special Service). Other lines are interrupted too (see [our Metro map indicating interrupted lines](#)).

From Madrid to the workshop venue:

You may use either the Metro subway as indicated above, or the Renfe railway, line C4, departing from Atocha Station in Madrid and going to Las Margaritas-Universidad station in the above campus map in 13 minutes.

If you stay in downtown Madrid, use the Metro directly to Getafe or to the Renfe station in Atocha as suits you best. The commute from the ICM area to Getafe is approximately as the journey from the airport.

Coming by car: follow the [Universidad Carlos III directions to get to its Getafe campus \(in Spanish\)](#).

Maps: [the Getafe street searcher \(with hotels and local info\)](#), [the Madrid Metropolitan subway network, with its interrupted lines in August 2006](#).

Getting on around Madrid:

The following sites may be of interest for your stay in Madrid:

Public transport: (beware of summer work-related disruptions on the Metro railway)

- Madrid Consortium of Transports (subway, urban and suburban buses, train): <http://www.ctm-madrid.es/>
- Madrid subway ('Metro' railway): <http://www.metromadrid.es/>
- Suburban trains ('Renfe' railway): http://www.ctm-madrid.es/red_transportes/renfe/red_renfe_esquema_general.jsp
- Buses: <http://www.emtmadrid.es/>

Tourism:

- Information from the Chamber of Commerce of Madrid: <http://www.descubremadrid.com/>
- and from the city council: <http://www.munimadrid.es/turismo>

Arts:

- Museo del Prado: <http://museoprado.mcu.es>
- Museo Nacional Centro de Arte Reina Sofía (modern art): <http://www.museoreinasofia.es>
- Museo Thyssen-Bornemisza: <http://www.museothyssen.org>

Food:

- Madrid gastronomy, according to the Spanish Tourism Office: <http://www.spain.info/TourSpain/Gastronomia/Cocina%20Regional/CCAA/N/0/C%20%20Madrid.htm?Language=es>
- "Tapas" in Madrid: <http://www.esmadrid.com/monograficos/tapas/start.swf>

VII Workshop on Symplectic and Contact Topology

Sponsors

[About Gesta](#)

[Organization](#)

[Program](#)

[Registration](#)

[Lodging](#)

[Venue](#)

[Sponsors](#)

[Contact](#)

[Ministerio de Educación y Ciencia](#)



[Real Sociedad Matemática Española](#)



[Societat Catalana de Matemàtiques](#)



[Universidad Carlos III](#)



[Consejo Superior de Investigaciones Científicas](#)



[Universidad Complutense de Madrid](#)

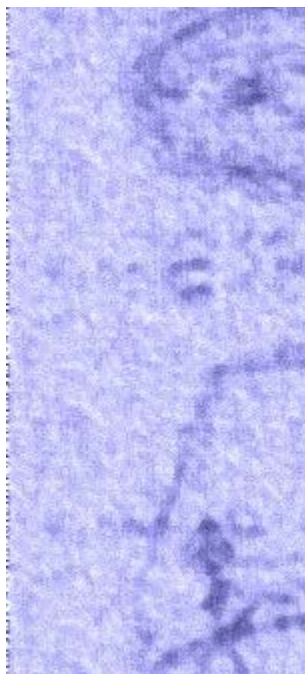


[Universidad del País Vasco](#)



[Universidad de Salamanca](#)





Universitat de Barcelona

Universitat Politècnica de Catalunya

Comunidad de Madrid



VII Workshop on Symplectic and Contact Topology

(GESTA 2006)

[About Gesta](#)

[Organization](#)

[Program](#)

[Registration](#)

[Lodging](#)

[Venue](#)

[Sponsors](#)

[Contact](#)

VII Workshop on Symplectic and Contact Topology

(GESTA 2006)

[About Gesta](#)

[Organization](#)

[Program](#)

[Registration](#)

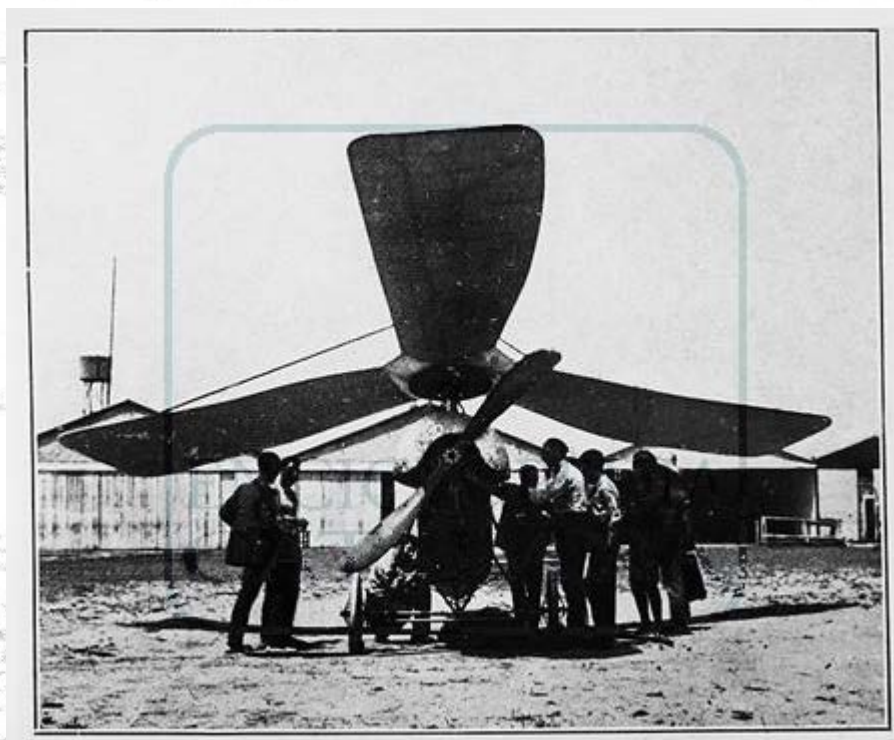
[Lodging](#)

[Venue](#)

[Sponsors](#)

[Contact](#)

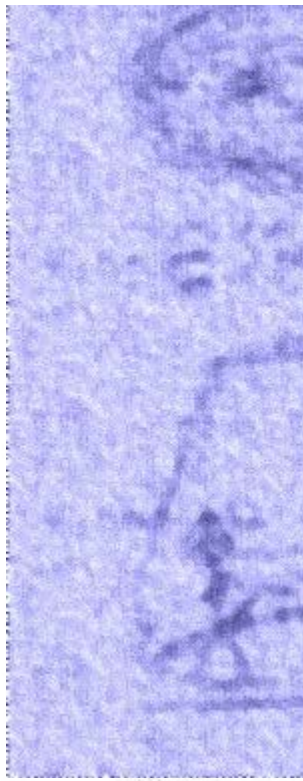
Pioneers of control theory (and practice)



Juan de la Cierva built in Getafe the Autogiro in 1923, the first vertically landing commercial aircraft. Manufactured in Getafe and Great Britain, the autogiro was used in the 1930s as a precursor to the helicopter and, evolved as the gyroplane, is still used today as a sporting light aircraft.



© Images from Science & Society Picture Library



simbología

- Transbordo entre líneas de Metro
- Transbordo largo entre líneas de Metro
- Estación con horario restringido
- Estación con acceso para personas con movilidad reducida. Ascensor
- Acceso con rampa
- Estación de Cercanías Renfe
- Terminal de autobús interurbano
- Aeropuerto de Madrid • Barajas

- Oficina de Información al Cliente
- Autobús a nueva Terminal T4
- Terminales Aeropuerto
- Sin servicio por obras
- Pasillo cerrado por obras
- Cambio tarifario

TRAJECTS MARKED AS HAVE SUBWAY SERVICE REPLACED BY A BUS TRANSFER. IT IS ADVICEABLE TO AVOID THEM. (August 2006)

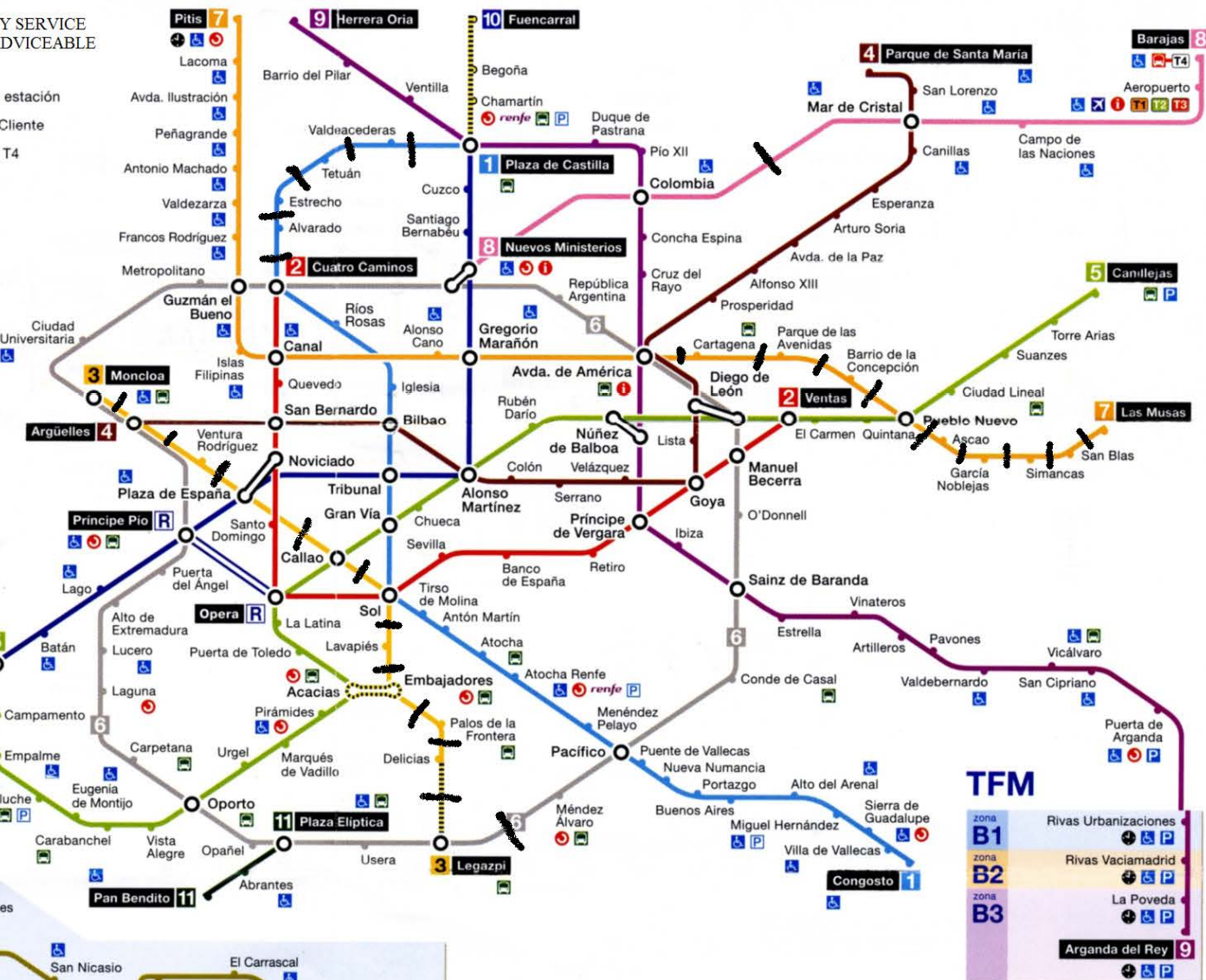


Marzo 2006/1



COMUNIDAD DE MADRID
Comunidad de Madrid

MetroSur



leyenda

- 1** Plaza de Castilla / Congosto
- 2** Ventas / Cuatros Caminos
- 3** Legazpi / Moncloa
- 4** Argüelles / Parque de Santa María
- 5** Canillejas / Casa de Campo
- 6** Circular
- 7** Las Musas / Pitis
- 8** Nuevos Ministerios / Barajas
- 9** Herrera Oria / Arganda del Rey
- 10** Fuencarral / Puerta del Sur
- 11** Plaza Elíptica / Pan Bedito
- 12** MetroSur
- R** Ópera / Príncipe Pío



VII Workshop on Symplectic and Contact Topology

Getafe, August 16-19, 2006

Universidad Carlos III de Madrid

Abstracts

This workshop is a satellite conference of ICM2006



Scientific Committee

Simon Donaldson, *Imperial College London*
Yakov Eliashberg, *Stanford University*
José Manuel Fernández de Labastida, *Universidad de Santiago de Compostela*
Kenji Fukaya, *Kyoto University*
Robert Gompf, *University of Texas at Austin*
Helmut Hofer, *Courant Institute*
Dusa McDuff, *Stony Brook University*
Gang Tian, *Princeton University*

Organizing Committee

Alberto Ibort, *Universidad Carlos III de Madrid* (chairman)
Jaume Amorós, *Universitat Politècnica de Catalunya*
Marisa Fernández, *Universidad del País Vasco*
David Martínez Torres, *Universiteit Utrecht*
Eva Miranda, *Université Paul Sabatier*
Ignasi Mundet i Riera, *Universitat de Barcelona*
Vicente Muñoz, *Consejo Superior de Investigaciones Científicas*
Francisco Presas, *Consejo Superior de Investigaciones Científicas*
Ignacio Sols, *Universidad Complutense de Madrid*
Carlos Tejero, *Universidad de Salamanca*

Index of abstracts

Invited lectures	1
Denis Auroux	1
Paul Biran	1
Kenji Fukaya	1
Robert Gompf	2
Ko Honda	2
Ludmil Katzarkov	2
Dusa McDuff	3
Grigory Mikhalkin	3
Tomasz Mrowka	3
Peter Ozsváth	3
Duong Phong	4
Bernd Siebert	4
Gang Tian	4
Contributed talks	5
Mohammed Abouzaid	5
Tolga Etgü	5
Roberto Ferreiro Pérez	5
Sergey Finashin	6
Agnès Gadbled	6
Paolo Ghiggini	6
Yoshihiko Mitsumatsu	6
Klaus Niederkrueger	7
Federica Pasquotto	7
Kouei Sekigawa	7
Rosa Sena-Dias	8
Aleksy Tralle	8
Michael Usher	8
Misha Verbitsky	9
Ben Weinkove	9
Chris Wendl	9
Nguyen Tien Zung	10
Posters	11
Hugo Jiménez	11
Cristina Martínez	11
Dmitri Millionschikov	11
Mounir Nisse	11
Andrés Pedroza	12
Masami Sekizawa	12

Takashi Tsuboi	12
Luis Ugarte	12
Esther Vergara	13
Andrés Viña	13
Fabian Ziltener	13

INVITED LECTURES

The canonical Lefschetz pencils of Horikawa surfaces

DENIS AUROUX

Massachusetts Institute of Technology

The Horikawa surfaces are explicit examples of complex surfaces of general type which are homeomorphic and have the same Seiberg-Witten invariants, but are not deformation equivalent. It is conjectured that they are not diffeomorphic; here we address the (weaker) conjecture that, equipped with their canonical Kahler forms, they are not symplectomorphic. One approach which is a priori promising is to study the Lefschetz pencils obtained from their canonical linear systems. We will discuss partial results on these examples which improve our understanding of their symplectic topology, albeit not enough to give an answer to the conjecture.

The Symplectic Mapping Class Group and Fillings

PAUL BIRAN

Tel-Aviv University

In this talk we present a new method to construct non-trivial elements in the symplectic mapping class group of many Stein manifolds. Our approach uses Lagrangian Floer theory and open book decompositions. Joint work with E. Giroux.

Loop space, pseudo holomorphic disc and Mirror symmetry

KENJI FUKAYA

Kyoto University

So far there are two methods to realize transversality in the Floer theory of Lagrangian submanifold. (There are similar problems for several other types of theories.) One is using singular theory and the other is de-Rham theory. By using the second method it is possible to keep more symmetry. On the other hand, if we use first method it is possible to work over rational (or integer sometime) coefficient. I want to explain the reason why it is important to keep symmetry to the application to Mirror symmetry and why de-Rham theory and usage of Loop space technique makes it possible. I want to also explain why it is difficult to do so in singular theory etc. (and over rational coefficient).

Constructing Stein surfaces by topological isotopy

ROBERT GOMPF

University of Texas at Austin

Stein surfaces (affine complex analytic surfaces) can be studied using the methods of topological 4-manifold theory. It is well known that Stein surfaces admit open handle decompositions with all indices at most 2. In fact, this condition is also sufficient to guarantee that an open subset U of a complex surface can be topologically isotoped so that the complex structure it inherits as an open subset is Stein. The isotopy cannot be made smooth in general, and there are frequently uncountably many choices for the resulting smooth structure on U . This theorem is a manifestation of Freedman's general principle that high-dimensional differential topology tends to work up to homeomorphism in dimension 4, as applied to Eliashberg's work on higher-dimensional Stein manifolds. By adapting Freedman's methods (Casson handles, gropes and reimbedding), one also obtains more detailed results. A tame 2-complex in a complex surface can be topologically ambiently isotoped so that it is smooth except at one point on each 2-cell, and has a system of Stein neighborhoods indexed by a Cantor set. These neighborhoods are homeomorphic to each other but frequently pairwise nondiffeomorphic.

Reeb vector fields and open book decompositions

KO HONDA

University of Southern California

According to a theorem of Giroux, there is a 1-1 correspondence between isotopy classes of contact structures and equivalence classes of open book decompositions. We prove that any contact structure (M, ξ) (in dimension 3) which is supported by an open book with periodic monodromy satisfies the Weinstein conjecture, namely any Reeb vector field R of (M, ξ) admits a closed orbit. The approach is to study holomorphic curves in the symplectization of (M, ξ) for a particularly nice Reeb vector field R , when ξ is universally tight with universal cover R^3 . In such a case we show that the contact homology is cylindrical and nonzero. This is joint work with Vincent Colin.

Homological Mirror Symmetry and Birational Geometry

LUDMIL KATZARKOV

Miami University

In this talk we will consider some applications of HMS to classical questions of algebraic geometry. New rationality criteria will be discussed.

Symplectic Characteristic classes

DUSA MCDUFF

Stony Brook University

A compact symplectic manifold (M, ω) possesses a very interesting group of structure preserving diffeomorphisms. When M is simply connected, the identity component of this group consists of Hamiltonian isotopies (each generated by a time dependent function on the manifold) and so is called the Hamiltonian group $\text{Ham}(M)$. Though this group is infinite dimensional, it is significantly smaller than the full group of diffeomorphisms of M and supports several characteristic classes that one can use to probe its topology.

This talk will explain several examples; for example the use of the action homomorphism to understand $\pi_1 \text{Ham}(M)$ for a toric manifold M (joint work with Sue Tolman) and the use of the coupling classes and various Gromov–Witten classes to understand the homotopy of $\text{Ham}(M)$ when M is a blow up.

Amoebas, co-amoebas and extremal properties of real plane algebraic curves

GRIGORY MIKHALKIN

University of Toronto

There are two particular sets that can be associated to an algebraic variety V in CP^n : its AMOEBA, or the image of V in R^n under the map taking the logarithm of the norms of the coordinates, and its CO-AMOEBA, or the image of V in the argument torus $(S^1)^n$. The talk will be focused on inter-relations among amoebas, co-amoebas and topological arrangement of the real part in the case $n = 2$.

To be Announced

TOMASZ MROWKA

Massachusetts Institute of Technology

Knot Floer homology

PETER OZSVÁTH

Columbia University

Knot Floer homology is an invariant for knots in the three-sphere, defined using methods from symplectic geometry. This invariant encodes a number of important properties of a knot: it detects the genus of the knot, and, according to a recent result of Ghiggini and Ni, it determines

whether or not the knot is fibered. I will describe some recent results which give a purely combinatorial method for computing knot Floer homology. I will discuss both joint work with Zoltán Szabó and also with Ciprian Manolescu and Sucharit Sarkar.

Symplectic forms for integrable models and Seiberg-Witten theory

DUONG PHONG

Columbia University

We construct a symplectic form in terms of Lax pairs which unifies the symplectic forms known before for a wide variety of integrable models. This symplectic form also applies to the Seiberg-Witten solution of many supersymmetric gauge theories. We discuss the solution of some of these theories, including some new spin chain models, twisted and untwisted Calogero-Moser systems, and the corresponding moduli spaces of spectral curves.

To be Announced

BERND SIEBERT

Universität Freiburg

Uniqueness of symplectic surfaces in rational 4-manifolds

GANG TIAN

Princeton University

CONTRIBUTED TALKS

Homological Mirror Symmetry and Toric Varieties

MOHAMMED ABOUZAID

University of Chicago

I will explain how tropical techniques give a correspondence between line bundles on a smooth projective Fano toric variety, and certain Lagrangian sections (with boundary) of the moment map on the complex torus. Together with Fukaya-Oh's description of moduli spaces of holomorphic discs with boundaries on Lagrangian sections of cotangent bundles in terms of gradient trees, this correspondence yields the desired equivalence between the derived category of coherent sheaves on a smooth projective Fano toric variety, and an appropriate subcategory of the derived Fukaya category of its mirror.

Explicit Horizontal Open Books on some Plumbings

TOLGA ETGÜ

Koç University

We describe explicit open books on arbitrary plumbings of oriented circle bundles over closed oriented surfaces. We show that, for a non-positive plumbing, the open book we construct is horizontal and the corresponding compatible contact structure is also horizontal and Stein fillable. In particular, we describe horizontal open books on some Seifert fibered 3-manifolds. As another application we describe horizontal open books isomorphic to Milnor open books for some complex surface singularities. Moreover we give examples of tight contact 3-manifolds supported by planar open books. As a consequence the Weinstein conjecture holds for these tight contact structures. (joint work with Burak Ozbagci)

Natural pre-symplectic structures and moment maps on spaces of Riemannian metrics

ROBERTO FERREIRO PÉREZ

Universidad Complutense de Madrid

If M is a compact $(4k-2)$ -manifold, the k -th Pontryagin form on the 1-jet bundle of Riemannian metrics provides a $Diff(M)$ -invariant pre-symplectic structure in the space of Riemannian metrics on M , and the k -th equivariant Pontryagin form determines a moment map for it. We show that in dimension 2, the corresponding Marsden-Weinstein quotient is the Teichmüller space endowed with the Weil-Petersson symplectic form. We also comment some partial results obtained in dimension 6.

Relative Seiberg-Witten and Ozsváth-Szabó invariants for surfaces in four-manifolds

SERGEY FINASHIN

Middle East Technical University

I will present my work math.GT/0401345, where the relative Seiberg-Witten (SW) and Ozsváth-Szabó (OS) invariants, for surfaces in 4-manifolds, were introduced and studied. Taubes previously introduced such relative invariants for tori, and we consider the case of higher genus. Refining the classical, “absolute” SW and OS invariants, the relative invariants have a similar package of properties, which look more naturally in the relative case. The product formula becomes a usual product of polynomials (like in the genus 1 case of Taubes), and the adjunction inequality that estimates genus of membranes on a given surface, has a classical form without positivity assumption on the self-intersection of a membrane. As a consequence, we obtain minimality of symplectic and lagrangian membranes (say, on lagrangian and respectively symplectic surfaces), which seems to be a new application.

Lagrangian embeddings in cotangent bundles

AGNÈS GADBLED

IRMA, Strasbourg

We give some conditions on the exact Lagrangian submanifolds with zero Maslov class in the cotangent bundle of a manifold endowed with a free action of the circle.

Knot Floer homology detects genus-one fibred knots

PAOLO GHIGGINI

Université du Québec à Montréal

Ozsváth and Szabó conjectured that knot Floer homology detects fibred knots. We propose a strategy to approach this conjecture based on Gabai’s theory of sutured manifold decomposition and contact topology. We implement this strategy for genus-one knots and links, obtaining as a corollary that if rational surgery on a knot K gives the Poincaré homology sphere $\Sigma(2, 3, 5)$, then K is the left-handed trefoil knot.

On Thurston’s inequality for spinnable foliations

YOSHIHIKO MITSUMATSU

Chuo University

This is a report on a joint work with Hiroki Kodama, Shigeaki Miyoshi, and Atsuhide Mori. We study how the topological properties of the monodromy of spinnable structure (=open book decomposition) are related with the convexity of the foliation and the contact structure

associated to the spinnable structure. We show that certain conditions on the monodromy imply the violation of absolute Thurston's inequality for the associated foliation. Passing through contact structures, this leads the violation of the relative inequality. Of course the violation for Thurston-Bennequin's inequality for associated contact structures are concluded as well. As an application we see certain mapping classes of surfaces with boundary can be written neither as products of right handed Dehn-twists nor as that of left-handed ones. This phenomena does not happen for closed surfaces.

The plastikstufe: A possible generalization of the overtwisted disk to higher dimensions?

KLAUS NIEDERKRUEGER

Université Libre de Bruxelles

In 3-dimensional contact topology, the distinction between tight and overtwisted structures was the first step towards the classification of contact manifolds.

The natural procedure to generalize these notions to higher dimensions would consist in looking at those properties of overtwisted 3-manifolds, which can be easily formulated idenpendently of the dimension. The proposed generalization should then imply at least some of these properties.

We define a submanifold foliated in a certain way by the contact structure, and show that its existence implies the non-fillability of the contact manifold. This makes it a candidate for being a higher-dimensional analogue of the overtwisted disk.

Closed characteristics on non-compact energy surfaces

FEDERICA PASQUOTTO

Vrije Universiteit Amsterdam

We introduce the problem of finding periodic orbits of a Hamiltonian vector field on a non-compact hypersurface and present a complete existence result in the case of hypersurfaces arising as level sets of classical mechanical Hamiltonians.

On the Goldberg Conjecture

KOUEI SEKIGAWA

Niigata University

Concerning the integrability of almost Kaehler manifolds, there is a long-standing conjecture by S. I. Goldberg (1969) saying that a compact almost Kaehler Einstein manifold is integrable (and hence, Kaehler Einstein). The conjecture is true in the case where the scalar curvature is non-negative (1987). However, the conjecture is still open in the case where the scalar curvature is negative. It is notable that non-compact complete counter examples to the conjecture are given by Apostolov, Draghici and Moroianu and also that an indefinite counter example is given by Matsushita. In the present talk, we introduce several partial affirmative answers to the conjecture and some related topics related to the conjecture.

References:

- [1] Apostolov, V., Draghici, T., Moroianu, A.: A splitting theorem for Kaehler manifolds whose Ricci tensors have constant values, *Intern. J. Math.*, 12, 769-789 (2001).
- [2] Apostolov, V., Gauduchon, P., Calderbank, D.M.J.: The geometry of weakly selfdual Kaehler surfaces. *Compositio Math.*, 135, 279-322 (2003).
- [3] Goldberg, S.I.: Integrability of almost Kaehler manifolds. *Proc. Amer. Math. Soc.*, 21, 96-100 (1969).
- [4] Nurowski, P., Przanowski, M.: A four-dimensional example of Ricci flat metric admitting almost Kaehler non-Kähler structure. *Classical Quantum Gravity*, 16, L9-L13 (1999).
- [5] Oguro, T., Sekigawa, K.: Notes on the Goldberg Conjecture in Dimension Four, *Complex, Contact and Symmetric Manifolds, In Honor of L. Vanhecke*, Birkhauser.
- [6] Sekigawa, K.: On some compact Einstein almost Kaehler manifolds. *J. Math. Soc. Japan*, 36, 677-684 (1987).

Estimated transversality and rational maps

ROSA SENA-DIAS

Harvard University

In his work on symplectic Lefschetz pencils, Donaldson introduced the notion of estimated transversality for a sequence of sections of a bundle. Together with asymptotic holomorphicity, it is the key ingredient allowing the construction of symplectic submanifolds. Despite its importance in the area, estimated transversality has remained a mysterious property. The aim of this talk is to shed some light into this notion by studying it in the simplest possible case namely that of S^2 . We state some new results about high degree rational maps on the 2-sphere that can be seen as consequences of Donaldson's existence theorem for pencils, and explain how one might go about answering a question of Donaldson: what is the best estimate for transversality that can be obtained? We also show how the methods applied to S^2 can be further generalized.

Lefschetz fibrations and symplectically aspherical groups

ALEKSY TRALLE

University of Warmia and Mazury

We are interested in closed symplectically aspherical manifolds, and ask a question: what groups can be realized as fundamental groups of such manifolds? In order to answer this question we find conditions ensuring the symplectic asphericity of total spaces of Lefschetz fibrations. This yields some realization results. This is a joint work with Kedra and Rudyak, and it is a continuation of the previous work.

Relative Gromov-Witten theory and symplectic 4-manifolds

MICHAEL USHER

Princeton University

In relative Gromov-Witten theory, one counts pseudoholomorphic curves either with prescribed asymptotic behavior or with prescribed tangencies to a symplectic hypersurface. I will discuss

how relative Gromov-Witten theory can be used to shed light on two natural questions about the topology of symplectic 4-manifolds:

1. Under what circumstances is the symplectic sum of two symplectic 4-manifolds minimal?
2. How is the monodromy of a Lefschetz fibration on a 4-manifold related to the topology of the total space?

Sasakian structures on contact manifolds

MISHA VERBITSKY

Institute of Theoretical and Experimental Physics, Moscow

Sasakian metrics play in contact geometry the same role as Kahler metrics play in symplectic geometry. We investigate the question of existence of a Sasakian structure on a given contact manifold M . We show that M admits Sasakian metrics if and only if M admits a pseudoconvex CR-structure, and a CR-holomorphic S^1 -action.

The Calabi-Yau equation on almost-Kahler four-manifolds

BEN WEINKOVE

Harvard University

Let (M, ω) be a compact symplectic 4-manifold with a compatible almost complex structure J . The problem of finding a J -compatible symplectic form with prescribed volume form is an almost-Kahler analogue of Yau's theorem and is connected to a programme in symplectic topology proposed by Donaldson. We call the corresponding equation for the symplectic form the 'Calabi-Yau equation'. It will be shown that a solution to this equation exists if the Nijenhuis tensor is small in the L^p norm for $p > 2$. Without this assumption, it is shown that the problem of existence can be reduced to obtaining a C^0 bound on a scalar potential function.

Holomorphic foliations in contact 3-manifolds

CHRIS WENDL

LMU Munich and MIT

Some powerful results related to the Weinstein conjecture for contact 3-manifolds have arisen from the existence of foliations by holomorphic curves: these sometimes give open book decompositions, or more generally, singular foliations transverse to the Reeb vector field.

The underlying moduli spaces have remarkable stability properties under homotopy and surgery, and also satisfy a uniquely low-dimensional version of Gromov compactness.

I will outline some recent results of this type and their possible implications, including an idea for Floer-type algebraic structures which should give rise to a distinctly three-dimensional cousin of symplectic field theory.

Intrinsic affinity and convexity of momentum maps

NGUYEN TIEN ZUNG

University of Toulouse

There are many convexity theorems in (quasi)symplectic geometry, some of which are very recent. I will present a unifying approach to these theorems, via local normal forms (of proper quasi-symplectic groupoids) and transverse affine structures. This talk will be based on my recent preprint [math.SG/0407208](#).

POSTERS

The 4-body Sitnikov problem

HUGO JIMÉNEZ

UAM-Iztapalapa

In this work, we introduce a generalization of the Sitnikov problem in a 2+2 configuration (a restricted 4-body problem). We apply time rescaling and canonical transformations for establish conditions in order to obtain periodic solutions, scapes and parabolic orbits.

Cohomology of Brill-Noether strata over Quot schemes

CRISTINA MARTÍNEZ

MPIM, Bonn

We define a Brill-Noether stratification over the Quot scheme parametrizing quotients of a trivial bundle on a curve and we compute their cohomology classes. We prove results on the non-emptiness, dimension and topology of these Brill-Noether loci.

Invariant Symplectic Structures on nilmanifolds

DMITRI MILLIONSCHIKOV

Moscow State University

We study left-invariant symplectic structures on nilmanifolds that correspond to filiform Lie algebras – nilpotent Lie algebras of the maximal length of the descending central sequence. Symplectic filiform Lie algebras in large dimensions can be described as special deformations of two series of graded filiform Lie algebras. We study deformations of graded Lie algebras with structure relations of the following form: $[e_i, e_j] = (j-i)e_{i+j}$. For dimensions $n \geq 16$ the moduli space \mathcal{M}_n of these deformations can be identified with the weighted projective space $KP^4(n-11, n-10, n-9, n-8, n-7)$ and for even dimensions n the subspace of symplectic Lie algebras is determined by one linear equation.

Amoebas of Minimal Area

MOUNIR NISSE

Université Paris 6

To any integer polytope Δ we define a non negative real invariant denotes $N(\Delta)$. The subject of this paper is to give a lower bound on the area of amoeba of algebraic curve in $(C^*)^2$ defined by a polynomial f with Newton Polygon $\Delta_f = \Delta$ in terms of $N(\Delta)$.

Hofer's metric of Cartesian products

ANDRÉS PEDROZA

Universidad de Colima

Let $f : M \rightarrow M$ be a Hamiltonian map of a closed symplectic manifold (M, ω) , and 1_N the identity map on closed symplectic manifold (N, η) . We prove that half of the Hofer norm of $f \in \text{Ham}(M, \omega)$ is less than or equal than the Hofer norm of $f \times 1_N \in \text{Ham}(M \times N, \omega \oplus \eta)$. A consequence of this result is that the Hofer diameter of $\text{Ham}(M \times N, \omega \oplus \eta)$ is infinite if the Hofer diameter of $\text{Ham}(M, \omega)$ is infinite.

On the geometry of orthonormal frame bundles

MASAMI SEKIZAWA

Tokyo Gakugei University

We are studying the geometry of orthonormal frame bundles over Riemannian manifolds, which are equipped, as submanifolds of the full frame bundles, by the induced Sasaki-Mok metric. All kinds of curvatures are calculated and many geometric results are proved. It seems that the geometry of the orthogonal frame bundles is much more interesting (and more “flexible”) than that of the general frame bundles studied earlier by L. A. Cordero and M. de León. Jointwork with O. Kowalski at Charles University in Prague.

On the simplicity of the group of contactomorphisms

TAKASHI TSUBOI

University of Tokyo

We consider the group $\text{Cont}_c^r(M^{2n+1}, \alpha)$ of C^r contactomorphisms with compact support of a contact manifold (M^{2n+1}, α) with the C^r topology. We show that the identity component $\text{Cont}_c^r(M^{2n+1}, \alpha)_0$ of the group of $\text{Cont}_c^r(M^{2n+1}, \alpha)$ is a simple group for $1 \leq r \leq n + (3/2)$.

Symplectic harmonicity and coeffective cohomology

LUIS UGARTE

Universidad de Zaragoza

Let ω be a symplectic form on a manifold M . Brylinski introduced the symplectic Hodge star operator $*_\omega$ and defined a closed differential form α on M to be ω -harmonic if $*_\omega \alpha$ is also closed. Mathieu proved that there exists a symplectically harmonic form in each de Rham cohomology class on M if and only if (M, ω) has the hard Lefschetz property. Thus, the dimension of the space of de Rham cohomology classes having symplectically harmonic representative tells us how close is the symplectic manifold to being hard Lefschetz. We consider the cohomology of the differential subcomplex of the de Rham complex consisting of the k -coeffective forms, i.e. those forms annihilated by ω^k , and relate these k -coeffective cohomology groups to the ω -harmonic

cohomology. We also study the variation of both cohomology groups under deformation of the symplectic structure. (Joint work with R. Villacampa)

Harmonic Almost Contact Structures

ESTHER VERGARA

University of York

An almost contact metric structure is parameterized by a section σ of an associated homogeneous fibre bundle, and equations for σ to be a harmonic section, a harmonic map, and various related conditions, are studied. These involve the characteristic vector field ξ and the almost complex structure in the contact subbundle. Examples are considered where σ is a harmonic section if and only if ξ is a harmonic unit vector field. These include all 3-dimensional almost contact structures, trans-Sasakian structures, and nearly cosymplectic structures. Almost contact structures induced on hypersurfaces of almost Hermitian manifolds are analyzed in terms of the ambient almost complex structure. A similar analysis is carried out when an almost contact manifold fibres over an almost Hermitian manifold, as exemplified by the Boothby-Wang fibration, and various types of warped product.

Lower bounds for $\sharp\pi_1(\mathbf{Ham}(M))$

ANDRÉS VIÑA

Universidad de Oviedo

Let $\mathbf{Ham}(G_s(\mathbb{C}^n))$ be the Hamiltonian group of the Grassmannian manifold $G_s(\mathbb{C}^n)$. We prove that $\sharp\pi_1(\mathbf{Ham}(G_s(\mathbb{C}^n))) \geq n$, if s and n are relatively prime. We also give a lower bound for $\sharp\pi_1(\mathbf{Ham}(M))$, when M is a coadjoint orbit of $SU(n+1)$. We deduce a sufficient condition for $\pi_1(\mathbf{Ham}(M))$ to contain a subgroup isomorphic to \mathbb{Z}^p , if M is a toric manifold. In particular, it turns out that $\mathbb{Z} \subset \pi_1(\mathbf{Ham}(M))$, when M is the one point blow up of $\mathbb{C}P^3$.

The Symplectic Vortex Equations over the Complex Plane and Quantum Cohomology

FABIAN ZILTENER

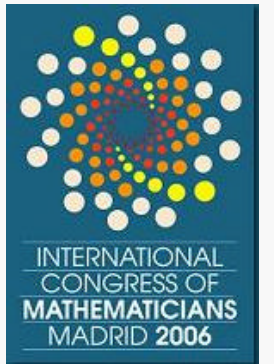
Ludwig-Maximilians-University Munich, Germany

The (symplectic) vortex equations are associated to a Hamiltonian action of a connected Lie group G on a symplectic manifold (M, ω) , and a principal G -bundle P over a Riemann surface Σ . They are equations for a pair (u, A) , where $u : P \rightarrow M$ is a G -equivariant map, and A is a connection 1-form on P . These equations were introduced by K. Cieliebak, R. Gaio and D. A. Salamon, and independently by I. Mundet i Riera. The poster explains how counting gauge equivalence classes of solutions of the vortex equations over $\Sigma := \mathbb{C}$ gives rise to a ring homomorphism from the equivariant cohomology of M to the quantum cohomology of the symplectic quotient, assuming that M is symplectically aspherical.



G
E
S
T
A
06

VII Workshop on Symplectic and Contact Topology



August 16-19, 2006, Universidad Carlos III, Getafe, Madrid

A satellite conference of ICM2006

Main Speakers include

Denis Auroux (MIT)

Paul Biran (Tel-Aviv University)

Robert Gompf (University of Texas at Austin)

Ko Honda (University of Southern California)

Ludmil Katzarkov (Miami University)

Dusa McDuff (Stony Brook University)

Grigory Mikhalkin (University of Toronto)

William P. Minnicozzi (Johns Hopkins University)

Tom Mrówka (MIT)

Peter S. Ozsváth (Columbia University)

Duong H. Phong (Columbia University)

Bernd Siebert (Universität Freiburg)

Scientific Committee

Simon Donaldson (Imperial College, London)

Yakov Eliashberg (Stanford University)

Kenji Fukaya (Kyoto University)

José Manuel F. de Labastida (U. Santiago de Compostela)

Robert Gompf (University of Texas at Austin)

Helmut Hofer (Courant Institute, New York)

Dusa McDuff (Stony Brook University)

Gang Tian (Princeton University)

Organizing Committee

Alberto Ibort (U. Carlos III de Madrid)

Jaume Amorós (U. Politècnica de Catalunya)

Marisa Fernández (U. País Vasco)

David Martínez (U. Utrecht)

Eva Miranda (U. Paul Sabatier)

Ignasi Mundet (U. Barcelona)

Vicente Muñoz (CSIC)

Francisco Presas (CSIC)

Ignacio Sols (U. Complutense de Madrid)

Carlos Tejero (U. Salamanca)

Deadlines

Abstracts submission: **May 1, 2006.**

Application for financial support: **June 1, 2006.**

Registration: **July 1, 2006.**

Conference webpage

<http://www.ma1.upc.edu/gesta/>

Contact

gesta@vilma.upc.edu

Sponsors



VII Workshop on Symplectic and Contact Topology (GESTA 2006)

[About Gesta](#)
[Organization](#)
[Program](#)
[Registration](#)
[Lodging](#)
[Venue](#)
[Sponsors](#)
[Contact](#)

**Universidad
Carlos III de
Madrid**

**Campus at Getafe
(Madrid)**

**August 16-19,
2006**



Here is the [official workshop picture](#).

Last minute informations:

- **Directions from the airport to the conference venue have changed!** Due to summer construction works some crucial subway lines are interrupted. See the updated directions in the [venue page](#), or [our subway map indicating which lines are interrupted](#).
- The [book of abstracts](#) is available.

A satellite conference to the [2006 International Congress of](#)

[Mathematicians in Madrid, Spain](#)



Download here [our poster](#).

The canonical Lefschetz pencils of Horikawa surfaces

DENNIS AUROUX

Massachusetts Institute of Technology

The Horikawa surfaces are explicit examples of complex surfaces of general type which are homeomorphic and have the same Seiberg-Witten invariants, but are not deformation equivalent. It is conjectured that they are not diffeomorphic; here we address the (weaker) conjecture that, equipped with their canonical Kahler forms, they are not symplectomorphic. One approach which is a priori promising is to study the Lefschetz pencils obtained from their canonical linear systems. We will discuss partial results on these examples which improve our understanding of their symplectic topology, albeit not enough to give an answer to the conjecture.

Homological Mirror Symmetry and Birational Geometry

LUDMIL KATZARKOV

University of Miami

In this talk we will consider some applications of HMS to classical questions of algebraic geometry. New rationality criteria will be discussed.

Symplectic forms for integrable models and Seiberg-Witten theory

DUONG PHONG

Columbia University

We construct a symplectic form in terms of Lax pairs which unifies the symplectic forms known before for a wide variety of integrable models. This symplectic form also applies to the Seiberg-Witten solution of many supersymmetric gauge theories. We discuss the solution of some of these theories, including some new spin chain models, twisted and untwisted Calogero-Moser systems, and the corresponding moduli spaces of spectral curves.

Amoebas, co-amoebas and extremal properties of real plane algebraic curves

GRIGORY MIKHALKIN

University of Toronto

There are two particular sets that can be associated to an algebraic variety V in CP^n : its AMOEBA, or the image of V in R^n under the map taking the logarithm of the norms of the coordinates, and its CO-AMOEBA, or the image of V in the argument torus $(S^1)^n$. The talk will be focused on inter-relations among amoebas, co-amoebas and topological arrangement of the real part in the case $n = 2$.

Tropical games and mirror symmetry

BERNDT SIEBERT

Albert-Ludwigs-Universität Freiburg

At the heart of my joint program with Mark Gross (UCSD) for a geometric explanation of mirror symmetry lie the notions of *toric degeneration* of complex varieties and its associated *intersection complex*. The latter should be viewed as *abstract tropical variety* whose underlying topological space is a manifold. In the talk I will explain that the picture is even nicer than ever hoped for: Under natural, mild conditions there is an algorithm producing canonically a toric degeneration with a given associated tropical manifold, to any finite order. The construction works by a combinatorial game that produces an ever growing number of polyhedral subsets of codimension one inside the tropical manifold.

This result not only provides an explicit framework for the study of refined mirror phenomena by tropical means, but it also gives a vast generalization of toric geometry where polytopes are replaced by (polarized) tropical manifolds.

Reeb vector fields and open book decompositions

KO HONDA

University of Southern California

According to a theorem of Giroux, there is a 1-1 correspondence between isotopy classes of contact structures and equivalence classes of open book decompositions. We prove that any contact structure (M, ξ) (in dimension 3) which is supported by an open book with periodic monodromy satisfies the Weinstein conjecture, namely any Reeb vector field R of (M, ξ) admits a closed orbit. The approach is to study holomorphic curves in the symplectization of (M, ξ) for a particularly nice Reeb vector field R , when ξ is universally tight with universal cover R^3 . In such a case we show that the contact homology is cylindrical and nonzero. This is joint work with Vincent Colin.

Intrinsic affinity and convexity of momentum maps

NGUYEN TIEN ZUNG

University of Toulouse

There are many convexity theorems in (quasi)symplectic geometry, some of which are very recent. I will present a unifying approach to these theorems, via local normal forms (of proper quasi-symplectic groupoids) and transverse affine structures. This talk will be based on my recent preprint [math.SG/0407208](#).

Relative Gromov-Witten theory and symplectic 4-manifolds

MICHAEL USHER

Princeton University

In relative Gromov-Witten theory, one counts pseudoholomorphic curves either with prescribed asymptotic behavior or with prescribed tangencies to a symplectic hypersurface. I will discuss how relative Gromov-Witten theory can be used to shed light on two natural questions about the topology of symplectic 4-manifolds:

1. Under what circumstances is the symplectic sum of two symplectic 4-manifolds minimal?
2. How is the monodromy of a Lefschetz fibration on a 4-manifold related to the topology of the total space?

SYMPLECTIC CHARACTERISTIC CLASSES

DUSA MCDUFF

A compact symplectic manifold (M, ω) possesses a very interesting group of structure preserving diffeomorphisms. When M is simply connected, the identity component of this group consists of Hamiltonian isotopies (each generated by a time dependent function on the manifold) and so is called the Hamiltonian group $\text{Ham}(M)$. Though this group is infinite dimensional, it is significantly smaller than the full group of diffeomorphisms of M and supports several characteristic classes that one can use to probe its topology.

This talk will explain several examples; for example the use of the action homomorphism to understand $\pi_1 \text{Ham}(M)$ for a toric manifold M (joint work with Sue Tolman) and the use of the coupling classes and various Gromov–Witten classes to understand the homotopy of $\text{Ham}(M)$ when M is a blow up.

DEPARTMENT OF MATHEMATICS, STONY BROOK UNIVERSITY, STONY BROOK, NY
11794-3651, USA

E-mail address: dusa@math.sunysb.edu

URL: <http://www.math.sunysb.edu/~dusa>

Date: July 22, 2005.

2000 Mathematics Subject Classification. 57S05, 53D45.

Key words and phrases. symplectomorphism group, symplectic characteristic classes.

Partly supported by the NSF grant DMS 0305939, 0604749.

Lefschetz fibrations and symplectically aspherical groups

ALEKSY TRALLE

University of Warmia and Mazury

We are interested in closed symplectically aspherical manifolds, and ask a question what groups can be realized as fundamental groups of such manifolds? In order to answer this question we find conditions ensuring the symplectic asphericity of total spaces of Lefschetz fibrations. This yields some realization results. This is a joint work with Kedra and Rudyak, and it is a continuation of the previous work.

Holomorphic foliations in contact 3-manifolds

CHRIS WENDL

LMU Munich and MIT

Some powerful results related to the Weinstein conjecture for contact 3-manifolds have arisen from the existence of foliations by holomorphic curves: these sometimes give open book decompositions, or more generally, singular foliations transverse to the Reeb vector field.

The underlying moduli spaces have remarkable stability properties under homotopy and surgery, and also satisfy a uniquely low-dimensional version of Gromov compactness.

I will outline some recent results of this type and their possible implications, including an idea for Floer-type algebraic structures which should give rise to a distinctly three-dimensional cousin of symplectic field theory.

The Calabi-Yau equation on almost-Kähler four-manifolds

BEN WEINKOVE

Harvard University

Let (M, ω) be a compact symplectic 4-manifold with a compatible almost complex structure J . The problem of finding a J -compatible symplectic form with prescribed volume form is an almost-Kähler analogue of Yau's theorem and is connected to a programme in symplectic topology proposed by Donaldson. We call the corresponding equation for the symplectic form the 'Calabi-Yau equation'. It will be shown that a solution to this equation exists if the Nijenhuis tensor is small in the L^p norm for $p > 2$. Without this assumption, it is shown that the problem of existence can be reduced to obtaining a C^0 bound on a scalar potential function.

Homological Mirror Symmetry and Toric Varieties

ABOUZAID, MOHAMMED

University of Chicago

I will explain how tropical techniques give a correspondence between line bundles on a smooth projective Fano toric variety, and certain Lagrangian sections (with boundary) of the moment map on the complex torus. Together with Fukaya-Oh's description of moduli spaces of holomorphic discs with boundaries on Lagrangian sections of cotangent bundles in terms of gradient trees, this correspondence yields the desired equivalence between the derived category of coherent sheaves on a smooth projective Fano toric variety, and an appropriate subcategory of the derived Fukaya category of its mirror.

The plastikstufe: A possible generalization of the overtwisted disk to higher dimensions?

KLAUS NIEDERKRUEGER

Université Libre de Bruxelles

In 3-dimensional contact topology, the distinction between tight and overtwisted structures was the first step towards the classification of contact manifolds.

The natural procedure to generalize these notions to higher dimensions would consist in looking at those properties of overtwisted 3-manifolds, which can be easily formulated independently of the dimension. The proposed generalization should then imply at least some of these properties.

We define a submanifold foliated in a certain way by the contact structure, and show that its existence implies the non-fillability of the contact manifold. This makes it a candidate for being a higher-dimensional analogue of the overtwisted disk.

Knot Floer homology detects genus-one fibred knots

PAOLO GHIGGINI

Universit du Québec à Montréal

Ozsváth and Szabó conjectured that knot Floer homology detects fibred knots. We propose a strategy to approach this conjecture based on Gabai's theory of sutured manifold decomposition and contact topology. We implement this strategy for genus-one knots and links, obtaining as a corollary that if rational surgery on a knot K gives the Poincaré homology sphere $\Sigma(2, 3, 5)$, then K is the left-handed trefoil knot.

The Symplectic Mapping Class Group and Fillings

PAUL BIRAN

Tel-Aviv University

In this talk we present a new method to construct non-trivial elements in the symplectic mapping class group of many Stein manifolds. Our approach uses Lagrangian Floer theory and open book decompositions. Joint work with E. Giroux.

Constructing Stein surfaces by topological isotopy

ROBERT GOMPF

University of Texas at Austin

Stein surfaces (affine complex analytic surfaces) can be studied using the methods of topological 4-manifold theory. It is well known that Stein surfaces admit open handle decompositions with all indices at most 2. In fact, this condition is also sufficient to guarantee that an open subset U of a complex surface can be topologically isotoped so that the complex structure it inherits as an open subset is Stein. The isotopy cannot be made smooth in general, and there are frequently uncountably many choices for the resulting smooth structure on U . This theorem is a manifestation of Freedman's general principle that high-dimensional differential topology tends to work up to homeomorphism in dimension 4, as applied to Eliashberg's work on higher-dimensional Stein manifolds. By adapting Freedman's methods (Casson handles, gropes and reimbedding), one also obtains more detailed results. A tame 2-complex in a complex surface can be topologically ambiently isotoped so that it is smooth except at one point on each 2-cell, and has a system of Stein neighborhoods indexed by a Cantor set. These neighborhoods are homeomorphic to each other but frequently pairwise nondiffeomorphic.

Uniqueness of symplectic surfaces in rational 4-manifolds

GANG TIAN

Massachusetts Institute of Technology

On the Goldberg Conjecture

KOUEI SEKIGAWA

Niigata University

Concerning the integrability of almost Kaehler manifolds, there is a long-standing conjecture by S.I.Goldberg (1969) saying that a compact almost Kaehler Einstein manifold is integrable (and hence, Kaehler Einstein). The conjecture is true in the case where the scalar curvature is non-negative (1987). However, the conjecture is still open in the case where the scalar curvature is negative. It is notable that non-compact complete counter examples to the conjecture are given by Apostolov, Draghici and Moroianu and also that an indefinite counter example is given by Matsushita. In the present talk, we introduce several partial affirmative answers to the conjecture and some related topics related to the conjecture.

References

- [1] Apostolov, V., Draghici, T., Moroianu, A.: A splitting theorem for Kaehler manifolds whose Ricci tensors have constant values, *Intern.J.Math.*, 12, 769-789 (2001).
- [2] Apostolov, V., Gauduchon, P., Calderbank, D.M.J.: The geometry of weakly selfdual Kaehler surfaces. *Compositio Math.*, 135, 279-322 (2003).
- [3] Goldberg, S.I.: Integrability of almost Kaehler manifolds. *Proc.Amer.Math.Soc.*, 21, 96-100 (1969).
- [4] Nurowski, P., Przanowski, M.: A four-dimensional example of Ricci flat metric admitting almost Kaehler non-Kaehler structure. *Classical Quantum Gravity*, 16, L9-L13 (1999).
- [5] Oguro, T., Sekigawa, K.: Notes on the Goldberg Conjecture in Dimension Four, Complex, Contact and Symmetric Manifolds, In Honor of L.Vanhecke, Birkhauser,
- [6] Sekigawa, K.: On some compact Einstein almost Kaehler manifolds. *J.Math.Soc.Japan.*, 36, 677-684 (1987).

Loop space, pseudo holomorphic disc and Mirror symmetry

KENJI FUKAYA

Kyoto University

So far there are two methods to realize transversality in the Floer theory of Lagrangian submanifold. (There are similar problem for several other types of theories.) One is using singular theory and the other is de-Rham theory. By using the second method it is possible to keep more symmetry. On the other hand, if we use first method it is possible to work over rational (or integer sometime) coefficient. I want to explain the reason why it is important to keep symmetry to the application to Mirror symmetry and why de-Rham theory and usage of Loop space technique makes it possible. I want to also explain why it is difficult to do so in singular theory etc. (and over rational coefficient).

Relative Seiberg-Witten and Ozsvath-Szabo invariants for surfaces in four-manifolds

SERGEY FINASHIN

Middle East Technical University

I will present my work math.GT/0401345, where the relative Seiberg-Witten (SW) and Ozsvath-Szabo (OS) invariants, for surfaces in 4-manifolds, were introduced and studied. Taubes previously introduced such relative invariants for tori, and we consider the case of higher genus. Refining the classical, “absolute” SW and OS invariants, the relative invariants have a similar package of properties, which look more naturally in the relative case. The product formula becomes a usual product of polynomials (like in the genus 1 case of Taubes), and the adjunction inequality that estimates genus of membranes on a given surface, has a classical form without positivity assumption on the self-intersection of a membrane. As a consequence, we obtain minimality of symplectic and lagrangian membranes (say, on lagrangian and respectively symplectic surfaces), which seems to be a new application.

Natural pre-symplectic structures and moment maps on spaces of Riemannian metrics

ROBERTO FERREIRO PEREZ

Universidad Complutense de Madrid

If M is a compact $(4k - 2)$ -manifold, the k -th Pontryagin form on the 1-jet bundle of Riemannian metrics provides a $Diff(M)$ -invariant pre-symplectic structure in the space of Riemannian metrics on M , and the k -th equivariant Pontryagin form determines a moment map for it. We show that in dimension 2, the corresponding Marsden-Weinstein quotient is the Teichmüller space endowed with the Weil-Petersson symplectic form. We also comment some partial results obtained in dimension 6.

Estimated transversality and rational maps

ROSA SENA-DIAS

Harvard University

In his work on symplectic Lefschetz pencils, Donaldson introduced the notion of estimated transversality for a sequence of sections of a bundle. Together with asymptotic holomorphicity, it is the key ingredient allowing the construction of symplectic submanifolds. Despite its importance in the area, estimated transversality has remained a mysterious property. The aim of this talk is to shed some light into this notion by studying it in the simplest possible case namely that of S^2 . We state some new results about high degree rational maps on the 2-sphere that can be seen as consequences of Donaldson's existence theorem for pencils, and explain how one might go about answering a question of Donaldson: what is the best estimate for transversality that can be obtained? We also show how the methods applied to S^2 can be further generalized.

On Thurston's inequality for spinnable foliations

YOSHIHIKO MITSUMATSU

Chuo University

This is a report on a joint work with Hiroki Kodama, Shigeaki Miyoshi, and Atsuhide Mori. We study how the topological properties of the monodromy of spinnable structure (=open book decomposition) are related with the convexity of the foliation and the contact structure associated to the spinnable structure. We show that certain conditions on the monodromy imply the violation of absolute Thurston's inequality for the associated foliation. Passing through contact structures, this leads the violation of the relative inequality. Of course the violation for Thurston-Bennequin's inequality for associated contact structures are concluded as well. As an application we see certain mapping classes of surfaces with boundary can be written neither as products of right handed Dehn-twists nor as that of left-handed ones. This phenomena does not happen for closed surfaces.

Lagrangian embeddings in cotangent bundles

AGNES GADBLED

IRMA

We give some conditions on the exact Lagrangian submanifolds with zero Maslov class in the cotangent bundle of a manifold endowed with a free action of the circle.

Closed characteristics on non-compact energy surfaces

FEDERICA PASQUOTTO

Vrije Universiteit Amsterdam

We introduce the problem of finding periodic orbits of a Hamiltonian vector field on a non-compact hypersurface and present a complete existence result in the case of hypersurfaces arising as level sets of classical mechanical Hamiltonians.

Explicit Horizontal Open Books on some Plumblings

TOLGA ETGU

Koc University

We describe explicit open books on arbitrary plumblings of oriented circle bundles over closed oriented surfaces. We show that, for a non-positive plumbing, the open book we construct is horizontal and the corresponding compatible contact structure is also horizontal and Stein fillable. In particular, we describe horizontal open books on some Seifert fibered 3-manifolds. As another application we describe horizontal open books isomorphic to Milnor open books for some complex surface singularities. Moreover we give examples of tight contact 3-manifolds supported by planar open books. As a consequence the Weinstein conjecture holds for these tight contact structures. (joint work with Burak Ozbagci)

Booking at the residence “Fernando de los Rios”, Universidad Carlos III de Madrid, “Symplectic and Contact Topology” GESTA 2006, August 16-19, 2006.

Please fill up this form and send it to the e-mail address

R.F.delosRios@fund.uc3m.es

if you wish to book a room at the Residence “Fernando de los Rios” during the celebration of the Internacional workshop on “Symplectic and Contact Topology” GESTA 2006, August 16-19, 2006. Mention GESTA 2006 in the Subject field of the message. Only a limited number of rooms are available that will be reserved as requested.

Surname:.....
First name:.....
Adress:.....
E-mail:.....
Arrival date:.....
Leaving date:.....
Single or double room:.....

COST OF THE ACCOMODATION

Per person per day (meals not included)

Double room 23,20 € + 7% VAT

Single room 46,40 € + 7% VAT

MEALS

Breakfast 1,10 € + 7% VAT

Lunch 3,60 € + 7% VAT

Dinner 3,60 € + 7% VAT

Full board 8,30 € + 7% VAT

VAT=Value Added Tax.