Du
19
AVR.
2021
au
16
JUIL.
2021

06h30
-
17h30

2021-T2 SYMPLECTIC TOPOLOGY, CONTACT TOPOLOGY AND INTERACTIONS

Symplectic topology, contact topology and interactions, Paris

IHP
Amphithéatre Darboux
Paris

Thematic trimester program at Institut Henri Poincaré, Paris (Back to main page)

It has been more than 25 years ago that the previous thematic program on symplectic topology took place at Institut Henri Poincaré. Since then, the field has undergone a spectacular transformation earning itself a central position in the mathematical landscape. It interacts strongly with other fields such as dynamical systems, low dimensional topology, homotopical algebra, and algebraic geometry.

Main events:

- April 19th to 23th: Introductory Spring School (online):
  Spring school main page

- April 26th to 30th, research conference
  From Hamiltonian Systems to Symplectic Topology and Beyond (online)
  This conference is organized by CIRM. Please register to the above website to participate.

- May 17th to 21st: research conference:
  Advances in Symplectic topology (online)

- The third conference has been cancelled

Weekly seminar & other activities

Zoom link:

https://us02web.zoom.us/j/86503014755?pwd=Q2tkQ2gwNXVqNU5RT3crWHo2SmJxUT09

- **Friday July 16th: Symplectic online seminar**

15h15 : **Helmut Hofer** (IAS) *: The Floer jungle: 35 years of Floer theory*
(Organized by the Berlin Mathematical School and the Symplectic Zoominar)
https://theias.zoom.us/j/97116147750?pwd=L2Fud1Y4Z2xsT3dhU2NrV0ZXd3lUQT09

- **Tuesday July 13th: Symplectic online seminar**

15h00 : **Morgan Weiler** *(RICE University): Progress towards new examples of knot-filtered ECH*
Abstract: Knot-filtered embedded contact homology is an invariant of an elliptic Reeb orbit of any contact form for a given contact structure on a closed, oriented three-manifold. It was introduced in a 2016 paper of Hutchings and enables embedded contact homology (ECH) to recover the Calabi invariant of the return map of a global surface of section of the Reeb vector field. Knot-filtered ECH is an invariant of the contact structure rather than the contact form, so it would be interesting to know what features of the contact structure it records. We will explain work in progress with Jo Nelson towards computing the knot filtered ECH of the right- and left-handed trefoil knots as elliptic orbits for different contact structures on S^3.

- **Friday July 9th: Symplectic online seminar**

10h45 : **Kaoru Ono** (Kyoto) *: Orbifold Lagrangian Floer theory*
Abstract: I will present a set-up for orbifold Lagrangian Floer theory,
We introduce the notion of dihedral twisted sectors for Lagrangians,
intersections of Lagrangians. Then I explain their role in the construction of
Floer theory. It is in collaboration with Bohui Chen and Bai-Ling Wang.

13h45 : **Georgios Dimitroglou Rizell** (Uppsala): *Non-squeezing of Legendrian knots into neighbourhoods of non-Legendrians and C^0 contactomorphisms*

Abstract: We discuss joint work with M. Sullivan where we show that a contactomorphism cannot squeeze some fixed Legendrian knot into an arbitrarily small neighbourhood of a non-Legendrian knot, under the additional constraint that the two knots become isotopic inside the neighbourhood, and that the contact manifold is tight. The techniques used are Giroux's theory of convex surfaces combined with Honda's study of solid tori with convex boundary. A corollary is that a smooth image of a Legendrian under a C^0-contactomorphism is again Legendrian (here tightness is not needed).

- **Friday July 2th: Symplectic online seminar**

10h45 : **Nancy Hingston** (College of New Jersey) *: String topology and self-intersections*
Abstract: String topology studies the algebraic structure of the homology of the free loop space of a manifold. I'll describe joint work with Nathalie Wahl about string topology operations, and about what these operations compute. We have simplified, chain-level definitions for the "loop" or "string" product and coproduct. The new definitions make possible new links between geometry and loop products. For example, If the k-fold coproduct of a homology class X on LM is nontrivial, then every representative of X contains a loop with a (k+1)-fold self-intersection.

13h45 : **Leonid Polterovich** (Tel Aviv) *: Symplectic cohomology and ideal valued measures*
Abstract: I will discuss three "big fiber theorems", the Conterpoint Theorem from combinatorics, the Gromov

Centerpoint Theorem from combinatorics, the Gromov Maximal Fiber Theorem from topology, and the Non-displaceable Fiber Theorem by Entov and myself, from a unified viewpoint provided by Gromov's ideal-valued measures.
The latter theory, in the symplectic context, is combined with relative symplectic cohomology developed by Varolgunes, yielding some applications to symplectic rigidity. Necessary preliminaries will be explained. A work in progress with Adi Dickstein, Yaniv Ganor, and Frol Zapolsky.

15h15 : **Felix Schlenk** (Tel Aviv) *: Symplectically knotted cubes*
*(*Talk shared with the Symplectic Zoominar)
Abstract: While by a result of McDuff the space of symplectic embeddings of a closed 4-ball into an open 4-ball is connected,
the situation for embeddings of cubes $C^4 = D^2 \times D^2$ is very different. For instance, for the open ball B^4 of capacity 1, there exists an explicit decreasing sequence $c_1, c_2, \dots \to 1/3$ such that for $c < c_k$ there are at least k symplectic embeddings of the closed cube $C^4(c)$ of capacity c into B^4 that are not isotopic. Furthermore, there are infinitely many non-isotopic symplectic embeddings of $C^4(1/3)$ into B^4.
A similar result holds for several other targets, like the open 4-cube, the complex projective plane, the product of two equal 2-spheres,
or a monotone product of such manifolds and any closed monotone toric symplectic manifold.
The proof uses exotic Lagrangian tori.
This is joint work with Joé Brendel and Grisha Mikhalkin.

- **Tuesday June 29th: Symplectic online seminar**

15h00 : **Noémie Legout** (Uppsala) *: Rabinowitz Floer complex for Lagrangian cobordisms*.
Abstract: I will define a Floer complex associated to a pair of transverse Lagrangian cobordisms in the symplectization of a contact manifold, by a count of SFT pseudo-holomorphic discs. Then I will show that this complex is endowed with an A_\infty structure. Moreover, I will describe a continuation element in the complex associated to a cobordism L and a small transverse push-off of L.

- **Friday June 25th: No seminar** (on account of the conference for S. Kharlamov's 70th birthday in Nantes)

- **Friday June 18th : Symplectic online seminar**

10h45 : **Sushmita Venugopalan** (IMSc Chennai) *: Tropical Fukaya Algebras*

Abstract: A multiple cut operation on a symplectic manifold produces a collection of cut spaces, each containing relative normal crossing divisors. We explore what happens to curve count-based invariants when a collection of cuts is applied to a symplectic manifold. The invariant we consider is the Fukaya algebra of a Lagrangian submanifold that is contained in the complement of relative divisors. The ordinary Fukaya algebra in the unbroken manifold is homotopy equivalent to a `broken Fukaya algebra' whose structure maps count `broken disks' associated with rigid tropical graphs. Via a further degeneration, the broken Fukaya algebra is homotopy equivalent to a `tropical Fukaya algebra' whose structure maps are sums of products over vertices of tropical graphs. This is joint work with Chris Woodward.

13h45 : **Steven Sivek** (Imperial College London) *: Khovanov homology and the cinquefoil*

Abstract: In this talk I will outline a proof that Khovanov homology detects the (2,5) torus knot. The proof makes use of deep results in Floer homology and many recent developments in Khovanov homology and homotopy, but, perhaps surprisingly, it does not require us to know that knot Floer homology detects T(2,5). This is joint work with John Baldwin and Ying Hu.

- **Friday June 11th : Symplectic online seminar**

10h45 : **Pierre Dehornoy** (U. Grenoble Alpes) *: The genus-one question for open book decomposition*

Abstract: In dimension 3, every contact structure is supported by an open book decomposition. When the structure is overtwisted one can strengthen the statement and have an OBD with genus-zero pages. For tight structures, there are many examples of OBD with genus-one pages, and Etnyre asked around 2006 whether it always exists. The question is still open. I will discuss a parallel and related question, for Anosov flows instead of contact structures. I will explain some constructions of genus-one OBD, and report on a partial result for OBD with genus-two pages (with the assistance of a computer).

13h45 : **Octav Cornea** (U. de Montréal) *: Triangulation and persistence*

Abstract: Mixing triangulation (in the sense of triangulated categories) with persistence
(as in persistence modules) leads to a class of interesting pseudo-metrics in a variety
of examples: metric spaces, Tamarkin categories, filtered topological spaces, Fukaya
categories. I will discuss some generalities concerning this machinery and how it
specifically applies to the symplectic context. The talk is based on joint work with
Paul Biran (ETH) and Jun Zhang (CRM).

- **Friday June 4th : Symplectic online seminar**

10h45 : **Alfonso Sorrentino** (U. Rome Tor Vergata) *: Rigidity phenomena in Billiard and Hamiltonian Dynamics*

Abstract: In this talk I shall address several rigidity questions appearing in the study of billiard maps and Hamiltonian dynamical systems, with a particular focus on their integrability and their action-spectral properties.

13h45 : **Yusuke Kawamoto** (ENS & Sorbonne Université) *: Around a Question of Entov-Polterovich-Py*

Abstract: In this talk I will discuss a celebrated question posed by Entov, Polterovich and Py on quasimorphisms. First I will explain my partial answer to this question which is based on my preprint and then I will explain other phenomena related to this topic which is a joint work with Egor Shelukhin.

- **Friday May 28th : Symplectic online seminar**

10h45 : **Alberto Abbondandolo** (Bochum) *: Bi-invariant Lorentz-Finsler structures on the linear symplectic group and contactomorphism group*

Abstract: It is well known that the linear symplectic group and the contactomorphism group do not admit any bi-invariant metric which is compatible with the Lie group topology. In this talk, I will discuss two mutually related bi-invariant Lorentz-Finsler structures on these groups. The talk is based on some work in progress with Gabriele Benedetti and Leonid Polterovich.

13h45 : **Marco Mazzucchelli** (ENS Lyon) *: A few properties of Besse contact manifolds.*

Abstract : A closed connected contact manifold is called Besse when all of its Reeb orbits are closed, and Zoll when furthermore all Reeb orbits have the same minimal period. In this talk, I will present a recollection of recent results/work in progress on the subject:
- It is known that Besse contact 3-spheres are strictly contactomorphic to rational ellipsoids. In higher dimensions, the analogous statement is open. Nevertheless, I will show that at least those contact (2n-1)-spheres that are convex hypersurfaces in symplectic vector spaces still "resemble" a rational ellipsoid. This is joint work with Marco Radeschi.
- Inspired by recent results on the systolic optimality of Zoll contact manifolds, I will show that Besse contact 3-manifolds are local maximizers of a suitable generalized systolic ratio. This is joint work with Alberto Abbondandolo and Christian Lange.

- **Friday May 7th : Symplectic online seminar**

10h45 : **Baptiste Chantraine** (Nantes) *:* compact objects in the Fukaya category and representations of Eliashberg-Chekanov algebra .

Abstract : Let L be a compact Lagrangian in a Weinstein manifold obtained from a subcritical one by attaching a handle along a Legendrian V. We will see how to associate to L a filling of a satelite of V and how this one induces a representation of the Chekanov-Eliashberg algebra of V. We will show that Legendrian contact homology linearised with respect to this representation recovers the Floer homology of L. We will talk about extensions of this considerations to A-infinity opérations on both sides. This is a joint work with G. Dimitroglou-Rizell and P. Ghiggini

---

13h45 : **Paolo Ghiggini** (Nantes) *:* Many real projective spaces are not Liouville fillable

Abstract : I will show that the standard contact structure on the real projective spaces RP^{4k+1} is not Liouville fillable using a classical argument on degeneration of moduli spaces of holomorphic spheres. A stronger result has been obtained by Zhengyi Zhou using more algebraic methods. This is a joint work with Klaus Niederküger

- **Tuesday May 4th : Graduate student day at IHP**

10h-12h Groupe de travail doctorants - Amphi Darboux

15h-18h Exposés des doctorants - Amphi Darboux

Organizing committee:

Jean-François Barraud (Toulouse)	Hélène Eynard-Bontemps (Paris)
Frédéric Bourgeois (Orsay)	Patrick Massot (Orsay)
Vincent Colin (Nantes)	Klaus Niederkrüger (Lyon)
Sylvain Courte (Grenoble)	Alexandru Oancea (Paris)
Vincent Humilière (École Polytechnique)	Sobhan Seyfaddini (Paris)
Mihai Damian (Stasbourg)	Anne Vaugon (Orsay)

Scientific committee:

Denis Auroux (Harvard)	Yasha Eliashberg (Stanford)
Paul Biran (Zurich)	Helmut Hofer (IAS Princeton)
Tobias Ekholm (Uppsala)	Dusa McDuff (Columbia)

Program coordinated by the Centre Emile Borel at IHP Sorbonne Université, CNRS.

also supported by:

URL de la page : https://www.ihp.fr/fr/agenda/symplectic-topology-contact-topology-and-interactions-paris&is_pdf=true

INSTITUT HENRI POINCARÉ

11 rue Pierre et Marie Curie
75231 Paris Cedex 05

HORAIRES

Lundi au vendredi : 8h30 à 18h
Fermé les jours fériés

URL de la page : https://www.ihp.fr/fr/agenda/symplectic-topology-contact-topology-and-interactions-paris&is_pdf=true