

# Louis Ioos

## Curriculum Vitae

Max Planck Institute for Mathematics  
Bonn 53111, Germany  
☎ +33661946096  
✉ ioos@mpim-bonn.mpg.de  
📄 louisioos.github.io

### Research area

#### Fields of expertise.

Differential, complex and symplectic geometry, global analysis on manifolds.

#### Themes.

Geometric quantization, local index theory, spectral theory.

#### Objects studied.

Bergman kernel, Toeplitz operators, semiclassical invariants.

### Academic positions

Since oct. 2021 **Post-doctoral fellow**, *Max Planck Institute for Mathematics*, Bonn, Germany.

2018–2021 **Post-doctoral fellow**, *Tel-Aviv University*, Tel-Aviv, Israel.  
Advisors : Lev Buhovsky, Leonid Polterovich

### Studies

31/05/2018 **PhD defense**, *Université Paris Diderot*.

Jury foreman : M. Jean-Michel Bismut,  
Jury members : M. Gilles Carron (referee),  
M. Eric Leitchnam,  
M. Xiaonan Ma (advisor),  
M. George Marinescu,  
M. Martin Schlichenmaier (referee).

2014–2018 **PhD in Mathematics**, *IMJ-PRG*, Paris, Advisor : Xiaonan Ma.

2013–2014 **Master 2 in Fundamental Mathematics**, *UPMC*, Paris, Honors.

2012–2013 **Master 2 in Mathematical Logic**, *Université Paris Diderot*, Paris, Honors.

2009–2012 **Work abroad**, *Australia, Asia, America*.

2008–2009 **Master 1 in Mathematics**, *Université de Versailles Saint-Quentin*, Versailles, Honors.

2007–2008 **Maîtrise in Mathematics**, *Université de Montréal*, Montréal, scholar.

2007 **Licence in Mathematics**, *Université de Versailles Saint-Quentin*, Versailles.

### Research funds raised

2014–2017 **Research Grant DIM RDM-IdF**, 5000 €.

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## Teaching

- 2nd semester 2018–2019 **Master 2 : Advanced topics in differential geometry**, *Assistant of L. Polterovich*, Tel Aviv University, 6 Lectures and Course preparation.
- 1st semester 2017–2018 **Licence 2 : Suites, séries et intégrales**, *Assistant of A. Jordan*, Université Pierre et Marie Curie, 12 Exercise sessions.
- 1st semester 2017–2018 **Licence 2 : Arithmétique pour informaticiens**, *Assistant of L. Koelblen*, Université Pierre et Marie Curie, 12 Exercise sessions.
- 1st semester 2016–2017 **Licence 1 : Analyse et algèbre pour les sciences**, *Assistant of E. Falbel*, Université Pierre et Marie Curie, 12 Exercise sessions.
- 1st semester 2016–2017 **Licence 2 : Fonctions de plusieurs variables et intégrales multiples**, *Assistant of P. Polo*, Université Pierre et Marie Curie, 12 Exercise sessions.
- 2nd semester 2015–2016 **Licence 3 : Analyse fonctionnelle**, *Assistant of D. Cordero-Erausquin*, Université Pierre et Marie Curie, 12 Exercise sessions.
- 1st semester 2015–2016 **Licence 3 : Probabilités élémentaires**, *Assistant of A. Lambert*, Université Pierre et Marie Curie, 12 Exercise sessions.
- 2nd semester 2014–2015 **Licence 2 : Intégrales multiples**, *Lecturer*, Université Pierre et Marie Curie, 12 Lectures, 12 Exercise sessions and Course preparation.
- 1st semester 2014–2015 **Licence 3 : Topologie et calcul différentiel**, *Assistant of P. Cherrier*, Université Pierre et Marie Curie, 12 Exercise sessions.

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## Organisation of scientific events

- Depuis nov. 2021 **Alternative Geometry seminar**, *Max Planck Institute of Bonn*, with Okke van Garderen.
- 15-19 nov. 2021 **Workshop on the semiclassical trace formula**, *Auffargis*, with Léo Bénard and Adrien Boulanger.
- 2016–2017 **Workshop : Riemann surfaces and algebraic curves**, *Université Pierre et Marie Curie*, with Léo Bénard and Adrien Boulanger.
- 2015–2016 **Workshop : Hilbert schemes**, *Université Pierre et Marie Curie*, with Nicolina Istrati.
- 2014–2015 **Workshop : GAGA**, *Université Pierre et Marie Curie*, with Léo Bénard and Nicolina Istrati.

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## Languages

- French **mother tongue**.
- English **fluent**.
- German **basic knowledge**.

## Talks

### A. Talks in seminar.

- 06/12/2021 **WWU Münster**, *Oberseminar*, Quantum measurement theory over projective manifolds.
- 08/12/2021 **Tel Aviv University**, *online*, *Geometry and Dynamics seminar*, Quantization in stages and canonical metrics.
- 27/04/2021 **Philipps-Universität Marburg**, *Differentialgeometrie und Analysis*, Survey on the semiclassical expansion of the Bergman kernel II.
- 20/04/2021 **Philipps-Universität Marburg**, *Differentialgeometrie und Analysis*, Survey on the semiclassical expansion of the Bergman kernel I.
- 01/04/2021 **University de Toulouse**, *Complex geometry seminar*, Quantization of Kähler-Ricci solitons.
- 22/03/2021 **Université Paris Sud**, *online*, *Harmonic Analysis seminar*, Donaldson's program for Kähler-Ricci solitons.
- 24/11/2020 **Philipps-Universität Marburg**, *online*, *Differentialgeometrie und Analysis*, Bergman kernels in the Yau-Tian-Donaldson program.
- 01/07/2020 **Université Paris Sud / UPMC**, *online*, *Analysis and Geometry seminar / Workshop on Dirac operators*, Applications of Berezin-Toeplitz quantization to Donaldson's program in Kähler geometry.
- 13/05/2020 **Tel Aviv University**, *online*, *Geometry and Dynamics seminar*, Almost-representations of the Lie algebra of  $SU(2)$  and quantization of the sphere.
- 08/01/2020 **Tel Aviv University**, *Geometry and Dynamics seminar*, Donaldson's iterations towards canonical Kähler metrics.
- 23/05/2019 **University of Geneva**, *Topology and Geometry seminar*, La Conjecture Asymptotique de Witten pour les représentations quantiques du Mapping Class Group.
- 06/03/2019 **Tel Aviv University**, *Geometry and Dynamics seminar*, Canonical Kähler metrics and quantization.
- 09/01/2019 **Aarhus University**, *QGM seminar*, Geometric quantization of symplectic maps and Witten's asymptotic conjecture.
- 31/10/2018 **Tel Aviv University**, *Geometry and Dynamics seminar*, Geometric quantization of Hamiltonian flows.
- 15/05/2018 **Université Paris sud, Orsay**, *Harmonic analysis seminar*, Asymptotique des états isotropes en quantification holomorphe.
- 20/03/2018 **University of Luxembourg**, *Working Group in Algebra, Geometry and Quantization*, Asymptotics of isotropic states in holomorphic quantization.
- 09/01/2018 **Institut de Mathématiques de Marseille**, *Complex geometry seminar*, Asymptotique des états isotropes en quantification holomorphe.
- 05/12/2017 **Universität zu Köln**, *Semi-classical analysis seminar*, Asymptotic expansion of isotropic states in holomorphic quantization.
- 24/04/2015 **Université Pierre et Mare Curie, Paris**, *Workshop on Higgs bundles*, Théorie de Chern-Simons.
- 04/03/2015 **Université Paris sud, Orsay**, *Workshop on Dirac operators*, Connexion de Hitchin et quantification géométrique.

## B. Talks in conferences.

- 15-19 dec. **Academia Sinica, Taipei**, *2019 Taipei conference in complex geometry*, Canonical  
2019 Kähler metrics and the spectral gap of the Berezin transform.
- 09-13 sept. **NTHU, Taiwan**, *Geoquant 2019*, Geometric quantization of symplectic maps  
2019 and semi-classical trace formulas.
- 15-19 july **Universität zu Köln**, *Quantization in symplectic geometry*, An operational point  
2019 of view on Berezin-Toeplitz quantization.
- 08-12 oct. **CIRM, Luminy**, *International Workshop on Geometric Quantization and Ap-*  
2018 *plications*, Geometric quantization of symplectic maps and Witten's asymptotic  
conjecture.
- 27-31 march **La Llagone, Matemale**, *Workshop on  $L^2$ -invariants*, Théorie de Hodge-de Rham,  
2017 noyau de la chaleur.

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## Research

### A. Publications.

1. **On the composition of Berezin-Toeplitz operators on symplectic manifolds**, *L. Ioos*, Math. Z. 290 (2018), no. 1-2, 539–559.
2. **Berezin-Toeplitz quantization for eigenstates of the Bochner-Laplacian on symplectic manifolds**, *L. Ioos, W. Lu, X. Ma, G. Marinescu*, J. Geom. Anal. 30 (2020), no. 3, 2615–2646.
3. **Geometric quantization of Hamiltonian flows and the Gutzwiller trace formula**, *L. Ioos*, Lett. Math. Phys. 110 (2020), 1585–1621.
4. **Spectral aspects of the Berezin transform**, *L. Ioos, V. Kaminker, L. Polterovich, D. Shmoish*, Ann. Henri Lebesgue 3 (2020), 1343–1387.
5. **Berezin-Toeplitz quantization and the least unsharpness principle**, *L. Ioos, D. Kazhdan, L. Polterovich*, Int. Math. Res. Not. IMRN 6 (2021), 4625–4656.
6. **Quantization and isotropic submanifolds**, *L. Ioos*, to appear in Michigan Math. J. (2021), 40 pp, doi.org/10.1307/mmj/20195787.
7. **Geometric quantization of symplectic maps and Witten's asymptotic conjecture**, *L. Ioos*, accepted in Adv. Math. (2021), 49 pp, arxiv.org/abs/1810.03589.

### B. Preprints.

8. **Almost representations of algebras and quantization**, *L. Ioos, D. Kazhdan, L. Polterovich*, submitted for publication (2020), 36 pp, arxiv.org/abs/2005.11693.
9. **Anticanonically balanced metrics on Fano manifolds**, *L. Ioos*, submitted for publication (2020), 38 pp, arxiv.org/abs/2006.05989.
10. **Balanced metrics for Kähler-Ricci solitons and quantized Futaki invariants**, *L. Ioos*, submitted for publication (2021), 46 pp, arxiv.org/abs/2101.10974.
11. **Quantization of symplectic fibrations and canonical metrics**, *L. Ioos, L. Polterovich*, submitted for publication (2021), 51 pp, arxiv.org/abs/2112.00419.