Scientific Report

The purpose of this visit was to develop research work on a joint project with Rémi Leclercq about the computation of Seidel elements of toric manifolds (M, ω) with a nef complex structure and its applications.

During this visit we made great progress regarding this computation. The main question is to count pseudo-holomorphic sections of an Hamiltonian fibration over S^2 with fiber (M, ω). Following the methods introduced by McDuff and Tolman in [2], we first turned this problem into the calculation of some Gromov-Witten invariants, which is, in general, a very hard problem. However, we showed that the total space of the fibration itself is a toric manifold and this now allows us to use particular formulas developped by H. Spielberg in [5] and which should soon lead us to the solution.

Moreover, we were able to relate the computation of the quantum cohomology in the nef case with a generalization of the Landau–Ginzburg potential following the same ideas of Y. Ostrover and I. Tyomkin in [3] which only apply to the Fano case. We also partly understood how our work relates to recent works by K. Fukaya, Y.-G. Oh, H. Ohta and K. Ono [4] and K. Chan, S. Lau, N. Leung and H. Tseng [1] where, in particular, they compute this deformed potential using different techniques. We have good hope to get information on this other viewpoint via the methods we explore.

We expect to produce an article containing these results in a near future.

During this visit I also gave a talk in the local *Séminaire Géométrie – Topologie Dynamique* entitled *The topology of symplectomorphism groups of 3–fold blow–ups of the projective plane* and concerning results which motivated the project described here.

References

[1] K. Chan, S.–C. Lau, N. Leung and H.–H. Tseng, *Open Gromov–Witten invariantsand mirror maps for semi–Fano toric manifolds*, arXiv:1112.0388v1 (2011).

[2] D. McDuff and S. Tolman, *Topological properties of Hamiltonian circle actions*, Int. Math. Res. Paper (2006), 72826, 1–77.

[3] Y. Ostrover and I. Tyomkin, *On the quantum homology algebra of toric Fano manifolds*, Selecta Math. (N.S.) **15** (2009), 121–149.

[4] K. Fukaya, Y.-G. Oh, H. Ohta and K. Ono, *Spectral invariants with bulks, quasi-morphisms, and Lagrangian Floer theory*, arXiv:1105.5123 (2011).

[5] H. Spielberg, *Counting generic genus–0 curves on Hirzebruch surfaces*, Proc. Amer. Math. Soc. **130** (2000), 1257–1264.