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Joint Harvard-CUHK-YMSC Differential Geometry Seminar

The Gopakumar-Vafa finiteness conjecture

Abstract: In 1998, using arguments from M-theory, Gopakumar and Vafa argued that there are integer BPS invariants of symplectic Calabi-Yau 3-folds. Unfortunately, they did not give a direct mathematical definition of their BPS invariants, but they predicted that they are related to the Gromov-Witten invariants by a transformation of the generating series. The Gopakumar-Vafa conjecture asserts that if one defines the BPS invariants indirectly through this procedure, then they satisfy an integrality and a (genus) finiteness condition.

The integrality conjecture has been resolved by Ionel and Parker. A key innovation of their proof is the introduction of the cluster formalism: an ingenious device to side-step questions regarding multiple covers and super-rigidity. Their argument could not resolve the finiteness conjecture, however. The reason for this is that it relies on Gromov's compactness theorem for pseudo-holomorphic maps which requires an a priori genus bound. It turns out, however, that rather powerful tools from geometric measure theory imply a compactness theorem for pseudo-holomorphic cycles. This can be used to upgrade Ionel and Parker's cluster formalism and prove both the integrality and finiteness conjecture.

This talk is based on joint work with Eleny Ionel and Aleksander Doan.

By

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Date:	March 9, 2022 (Wednesday)
Time:	4:00pm – 5:00pm (Hong Kong Time)
Zoom Link:	https://cuhk.zoom.us/j/95974708402 (Meeting ID: 959 7470 8402; Passcode: 20220309)

All are Welcome