Contribution ID: **100** Type: **Oral Presentation**

Contact Geometry and Quantum Mechanics

Monday, July 29, 2019 2:00 PM (20 minutes)

Quantization together with quantum dynamics can be simultaneously formulated as the problem of finding an appropriate flat connection on a Hilbert bundle over a contact manifold. Contact geometry treats time, generalized positions and momenta as points on an underlying phase-spacetime and reduces classical mechanics to contact topology. Contact quantization describes quantum dynamics in terms of parallel transport for a flat connection; the ultimate goal being to also handle quantum systems in terms of contact topology. Our main result is a proof of local, formal gauge equivalence for a broad class of quantum dynamical systems—just as classical dynamics depends on choices of clocks, local quantum dynamics can be reduced to a problem of studying gauge transformations. We further show how to write quantum correlators in terms of parallel transport and in turn matrix elements for Hilbert bundle gauge transformations, and give the path integral formulation of these results. Finally, we show how to relate topology of the underlying contact manifold to boundary conditions for quantum wave functions.

Authors: Prof. WALDRON, Andrew (Department of Mathematics and QMAP, University of California Davis,); Dr HERCZEG, Gabriel (Brown University)

Presenter: Prof. WALDRON, Andrew (Department of Mathematics and QMAP, University of California Davis,)

Session Classification: Field & String Theory

Track Classification: Field & String Theory