

## **Integral equation methods for the Laplace-Beltrami problem**

Mike O'Neil, Courant Institute, NYU

The Laplace-Beltrami operator arises in various fields of applied mathematics and physics, as well as in data analysis. In this talk, we will present a robust, high-order boundary integral equation method for solving the Laplace-Beltrami problem  $\Delta_{\Gamma} \phi = f$  along smooth closed surfaces in three dimensions. Using so-called Calderon projectors, this variable coefficient surface PDE can be pre-conditioned into an integral equation whose kernels only depend on the free-space Green's function for the Laplace operator. The resulting solver is easily accelerated via fast multipole methods, and various numerical examples will be provided.