1139-35-549 **Leandro Lichtenfelz**, **Gerard Misiolek** and **Stephen C. Preston*** (stephen.preston@brooklyn.cuny.edu). *Axisymmetric ideal fluids on Riemannian 3-manifolds.*

In 3-dimensional Euclidean space, there are three symmetries one can impose to reduce the Euler equations to a manageable system: translational symmetry (which decouples into 2-D Euler and a transported third component); rotational symmetry (to get the axisymmetric equations with swirl); and a "screw" symmetry which combines both. However all these situations are either too simple (due to decoupling) or too complicated (due to singular behavior on the axis and nonconstant coefficients).

In this talk we will present the analogue of axisymmetric fluid flows on Riemannian 3-manifolds, in particular the eight Thurston geometries that have the most symmetries. Some of these geometries even have stagnation-point solutions which reduce to one-dimensional PDEs that are simpler than those appearing in the axisymmetric case. As one example, the reduced equation on $SL_2(\mathbb{R})$ becomes the system

$$\Delta f_t + \{f, \Delta f\} - \{f, g\} = 0, \quad g_t + \{f, g\} = 0$$

for a stream function f and swirl g on $\mathbb{R}^2$, which is analogous to the 2D Boussinesq equation. (Received February 19, 2018)