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Spin dewetting of wetting and partially wetting fluids SHOMEEK MUKHOPADHYAY, ROBERT BEHRINGER, Physics Department, Duke University — One of the classical results of fluid dynamics is the free-surface flow of a viscous liquid in a vertically rotating cylinder, where the free surface becomes a paraboloid. This solution neglects both viscosity and surface tension, and makes the unphysical prediction that the fluid height can become negative beyond a certain critical angular velocity (for a given fluid height). We perform experiments with completely wetting PDMS oil on silcon wafer, where beyond the critical angular velocity, the central region never dewets, but goes to a nominally flat state over long times. The dynamics of the transition to this final state depends on the angular speed and the initial radius of the dewetting region. There is a marked difference in the spin-up and spin-down dynamics. When the completely wetting liquid is replaced by a partially wetting liquid a dry central spot opens up, occasionally leaving a droplet trail. In both cases the contact line does not develop any azimuthal instabilities. Collaboration with Tom Witelski and Mihaela Froehlich.

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