Cowboy Fluid Mechanics: Lariat Modes of a Viscous Rope NEIL RIBE, Laboratoire FAST, Orsay, France, SARAH BADR, Universite de Paris-Sud, Orsay, France, STEPHEN MORRIS, University of Toronto, Toronto, Canada — A thin filament of viscous fluid falling onto a surface winds itself into a helical coil whose angular frequency of rotation $\Omega$ depends on the fall height $H$, the flow rate, and the fluid properties. We have studied a novel variant of this phenomenon in which the nozzle ejecting the fluid rotates about a vertical axis at a constant rate $\omega$. In laboratory experiments using viscous corn syrup, we observe that the filament coils in the normal way when $\omega \ll \Omega$. However, when $\omega \approx \Omega$ and $H$ is sufficiently large, a new “lariat” mode appears in which the filament is thrown outward in the form of a spiral of large diameter (up to tens of cm) rotating at a rate $\approx 0.9\omega$. The transition between the coiling and lariat modes is hysteretic with respect to variations in $\omega$. In addition to the laboratory experiments, we will also present preliminary results of numerical calculations of the lariat mode based on a “slender body” model for a viscous filament with inertia.