Abstract Submitted for the DFD17 Meeting of The American Physical Society

**Particle-inertia and phase-change induced vortex-dipole collapse**<sup>1</sup> S. RAVICHANDRAN, Jawaharlal Nehru Centre for Advanced Scientific Research, RAMA GOVINDARAJAN, International Centre for Theoretical Sciences — Nonbuoyant vortices in a dipole move in straight lines perpendicular to the line joining them. Quite to the contrary, we showed that buoyant vortices can collide with and annihilate each other. We present results from analytical considerations and extensive numerical simulations to show how such a collapse can be caused by the combined effects of particle inertia and the thermodynamics of phase change. We use the thermodynamics of the water vapour–liquid water system, with water droplets forming the particle phase. Water droplets are thrown out of the vicinity of the vortices, thus making the vortices devoid of condensation nuclei. This leaves the vortices colder than their surroundings, making them buoyant, and possibly leading to a collapse. We show that collapse occurs only when the product of the particleand phase-change- Stokes numbers is greater than a threshold. We discuss potential implications for the fluid dynamics of clouds.

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Date submitted: 01 Aug 2017

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