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Surface Tension and Negative Pressure Interior of a Non-Singular "Black Hole" EMIL MOTTOLA, heoretical Division, Los Alamos National Laboratory, Los Alamos, NM 87545 USA, PAWEL MAZUR, Department of Physics and Astronomy, University of South Carolina, Columbia, SC 29208 USA — The interior Schwarzschild solution for a static, spherically symmetric collapsed star has a pressure divergence that is integrable, and induces a non-isotropic transverse stress with a finite surface energy and surface tension. When compressed to the Schwarzschild radius, the surface is at the same radius and the interior solution has constant negative pressure, thereby describing a gravitational condensate star, a fully collapsed state already inherent in and predicted by classical General Relativity. The redshifted surface tension of the condensate star surface is given by is the difference of surface gravities between the exterior and interior Schwarzschild solutions. The First Law, $dM = dE_v + \tau dA$ is a purely mechanical classical relation at zero temperature and zero entropy, describing the volume energy and surface energy respectively. Since there is no event horizon, the Schwarzschild time of such a non-singular gravitational condensate star is a global time, which is consistent with unitary time evolution in quantum theory. The interior acts as a defocusing lens for light passing through the condensate, leading to imaging characteristics distinguishable from a black hole. The discrete surface modes of oscillation which should be detectable by their GWave signatures

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