Newtonian Collapse of Scalar Field Dark Matter F. Siddhartha Guzmán and L. Arturo Ureña-López

1Max Planck Institut für Gravitationsphysik, Albert Einstein Institut, Am Mühlenberg 1, 14476 Golm, Germany.

04.40.-b, 98.35.Jk, 98.62.Gq astro-ph/xxxx

abstract In this letter, we develop a Newtonian approach to the collapse of galaxy fluctuations of scalar field dark matter under initial conditions inferred from simple assumptions. The full relativistic system, the so called Einstein-Klein-Gordon, is reduced to the Schrödinger-Newton one in the weak field limit. The scaling symmetries of the SN equations are exploited to track the non-linear collapse of single scalar matter fluctuations. The results can be applied to both real and complex scalar fields.