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The ground and resonant states of three self-gravitating bosons and fermions[1] YEW KAM EUGENE HO, SABYASACHI KAR , Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan — Recently, a new property of the Bose-Einstein condensates (BECs) has been proposed [1] that it is self bound for sufficiently strong self-gravitation, opening up a door to study self-gravitating systems with attractive $1/r$ potentials. Such an attractive potential can simulate gravity between the quantum systems. In the usual strong anisotropy regime, the inter-atomic potential takes a form of –u/r, where u is the coupling constant dependent on the laser intensity. Recently, we have investigated the ground state, excited states, and resonance states for three self-gravitating bosons and fermions using highly correlated exponential basis functions [2]. Our calculated bound states energies are lower than the earlier results in the literature [3]. We have also employed the complex-coordinate rotation method [4] to calculate the energies and widths for resonances lying below the $N = 2$ and $N = 3$ thresholds of the two-body subsystems [2]. [1] D. O'Dell *et al.*, Phys. Rev. Lett. **84**, 5687 (2000); Phys. Rev. A **63**, 031603 (2001). [2] S. Kar and Y. K. Ho, Phys. Rev. A **76**, 032711(2007); Phys. Lett.*A***370**, 306 (2007) ; to be published. [3] J. P. D'Incao *et al.*, *Phys. Rev. A* **75**, 032503 (2007). [4] Y. K. Ho, *Phys. Reports* **99**, 1 (1983).

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