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Size scaling of self gravitating polymers and strings

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We study a statistical ensemble of a single polymer with self gravitational interaction. This is a model of a gravitating string – the precursor of a black hole. We analyze averaged sizes by mean field approximations with an effective Hamiltonian a la Edwards with Newtonian potential as well as a contact repulsive interaction. We find that there exists a certain scaling region where the attractive and the repulsive forces balance out. The repulsive interaction pushes the critical gravitational coupling to a larger value, at which the size of a polymer becomes comparable to its Schwarzschild radius, and as a result the size of the corresponding black hole increases considerably.

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