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The Interaction of Nuclei in the Gravitational Fields of Mini Black Holes LAUREN GREENSPAN, Cyclotron Institute — The goal of this research was to find solutions to the Schrodinger equation that describe particle scattering around black holes around eighteen orders smaller and less massive than our sun. Black holes of this kind could have formed in density irregularities in primordial space just after the big bang and can answer cosmological questions as well as providing a setting for research in quantum-gravity. Black holes go along with the theory of general relativity, but since mini black holes can be comparable in size to nucleons, the project also considers the limit at which the black hole must obey Quantum Mechanical law. A large emphasis was placed on the choice of a coordinate system and its implications on general relativity and the curvature of space-time. To get rid of unwanted singularities we chose the Eddington-Finkelstein metric and used it to evaluate the Klein-Gordon equation. From this we derived the potentials for the black hole and used them to calculate the absorption cross-section in the non-relativistic limit. As an additional exercise, we calculated the possible bound states of a particle with the black hole and the amount of mass it could gain based on the expected cross-section.

Lauren Greenspan
Cyclotron Institute

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