Abstract Submitted
for the 4CS20 Meeting of
The American Physical Society

Investigating the Blandford-Znajek Process for Black Hole Jets
MELISSA RASMUSSEN, Utah State University — Streams of charged particles ejected from the poles of black holes may be explained by the Blandford-Znajek process. In this theory, a spinning black hole, surrounded by an electromagnetic field, drags and twists the electromagnetic field around itself. The twisted electromagnetic field may catch charged particles near the black holes event horizon and funnel them to the two poles, producing these black hole jets that travel at a significant fraction of the speed of light. This projects goal is to find possible mathematical solutions to describe the situations that could give rise to these jets. More specifically, we solve Einsteins equations in an asymptotically flat spacetime for a spinning black hole in an electromagnetic field. The Blandford-Znajek model then allows us to determine whether a particular solution allows for the extraction of energy from a black hole. Unlike other research studying this phenomenon, we study only particles in the immediate vicinity of the black holes event horizon, disregarding any accretion disk or effect of gravity from any object but the black hole. In this presentation, we expound upon the background and methods of the research, and discuss our results thus far.

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Date submitted: 29 Sep 2020 Electronic form version 1.4