



Canadian Association  
of Physicists

Association canadienne  
des physiciens et physiciennes

Contribution ID: 4292 Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

## **(G\*) Proving the Penrose Inequality in (Spherically Symmetric) AdS with Charge**

*Tuesday 28 May 2024 11:00 (15 minutes)*

One of the most important results in mathematical general relativity in the last half century is the inequality, conjectured by Penrose in 1973, that the mass inside a black hole has a lower bound determined by the area of the black hole's event horizon, and that the minimal case is realized by the Schwarzschild black hole. While a fully general proof of the conjecture does not yet exist, it has been proved in the cases of extrinsically flat spatial slices (Riemann-Penrose inequality) and in the general case under the assumption of spherical symmetry. We seek to extend the spherically-symmetric proofs of the conjecture to include electric charge (Einstein-Maxwell theory in  $(n + 1)$ -dimension) in an anti-deSitter background, where the rigidity case of the inequality is now Reissner-Nordström AdS. In the future, our goal is to extend our proof to Gauss-Bonnet gravity. This is on-going work which is the subject of the author's PhD thesis.

### **Keyword-1**

penrose inequality

### **Keyword-2**

black holes

### **Keyword-3**

general relativity

**Author:** MUTH, Sarah

**Co-authors:** KUNDURI, Hari (McMaster University, Mathematics and Physics); MARGALEF, Juan (Memorial University)

**Presenter:** MUTH, Sarah

**Session Classification:** (DTP) T1-2 Black Holes I | Trous noirs I (DPT)

**Track Classification:** Technical Sessions / Sessions techniques: Theoretical Physics / Physique théorique (DTP-DPT)