IV Mesoamerican Workshop on Cosmology and Gravity

November 9-10, 2020

"Self-gravitating superconductors and contact geometry"

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In this talk we will present some elementary notions in contact metric geometry. In particular, we will revisit the definition of Beltrami fields and its relation with force free magnetic fields. We will show that, in the three dimensional case, these are encoded precisely in the defining structures of a contact metric manifold. In particular, by considering a novel Lorentzian metric on the three-sphere, we obtain the conditions that must be satisfied so that it is a New Massive Gravity vacuum and those for a self-gravitating force-free magnetic field where spacetime acts as an effective superconducting medium. These results are relevant in the emerging area of geometric metamaterials, where the induced electromagnetic fields propagate on a curved spacetime analogue.

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