



universität**bonn**

Bethe Colloquium

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Swampland Constraints on SM Physics and the Cosmological Constant

The swampland is the space of field theories which cannot be embedded into a consistent theory of quantum gravity. Recently substantial effort has been dedicated to understand this swampland in terms of black-hole physics and string theory. One of the leading ideas is the weak gravity conjecture and different generalisations and extensions. In one of them Ooguri and Vafa have conjectured that no consistent theory of quantum gravity can contain AdS non-SUSY, stable minima. Applying this criterium to the SM and its compactifications to 3 and 2 dimensions, one can derive strong constraints on neutrino masses and the cosmological constant. The lightest neutrino mass is predicted to be lighter than the cosmological constant scale. This bound, for fixed Yukawa couplings, implies that values of the Electro-Weak scale above 1 TeV would be in the swampland and would not count as possible consistent theories. This would bring a new perspective into the issue of the EW hierarchy.

Lecture Hall 1

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Thursday, 11th January, 2018, at 16 c.t.

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