



universität**bonn**

# Bethe Colloquium

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## Probing the Atomic Higgs Force

After the discovery of the Higgs particle at the Large Hadron Collider, the Higgs mechanism is expected to account for the masses of the fundamental particles. We argue that, while this is true for the electroweak gauge bosons, we are still in the dark regarding the origin of the charged fermions masses, in particular, electron, up and down quark. It motivates us to propose a non-collider approach to probe Higgs boson couplings to these matter constituents via precision measurement of isotope shifts in atomic clock transitions. We present an experimental method which competes with and potentially surpasses the LHC in bounding the Higgs-to-light-fermion couplings. Better knowledge of the latter is an important test of the Standard Model and could lead to an alternative understanding of the flavor puzzle (the fact that the fermion masses span five orders of magnitude in scale). We will then discuss how to translate the above (potential) fantastic sensitivity to constrain the presence of heavy new particles that are well beyond the reach of near future accelerators.

### Lecture Hall 1

Physikalisches Institut - Nussallee 12 - 53115 Bonn

**Thursday, 2<sup>nd</sup> June, 2016, at 16 c.t.**

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