Contribution ID: **78** Type: **Oral**

Neutrinoless double beta decay nuclear matrix elements with energy density functional methods

Monday, 31 August 2015 16:45 (15 minutes)

Potential detection of non-conserving lepton number processes, such as the neutrinoless double beta decay, constitutes one of the most promising signals of new physics beyond the Standard Model, apart from experiments using high energy collisions performed at LHC (CERN). In the neutrinoless double beta decay ($0\nu\beta\beta$) two neutrons are transformed into two protons and only two electrons are emitted in the final state. This is a very encouraging case due to its implications in fundamental physics since it can only occur if neutrinos are massive and Majorana particles (neutrinos and antineutrinos are identical particles). Additionally, the inverse of the half-life of this process is proportional to the neutrino effective mass. Therefore, an eventual detection of this decay mode would determine the absolute scale of the mass of these elementary particles. Nevertheless, there exist two main unsolved problems in this field: 1) Despite the increasing experimental efforts, $0\nu\beta\beta$ decay has not been detected yet due to the very long half-lives (> 10^25 years) that require ultra-low background experiments; 2) Once the half-life of a given double-beta emitter is experimentally measured, the absolute scale of the neutrino mass can be only determined if the so-called nuclear matrix element (NME), that connects initial and final nuclear states, is accurately known. In this contribution I will present the current status and future perspectives for nuclear matrix elements calculations performed with energy density functional methods.

Primary author: RODRÍGUEZ, Tomás R. (Universidad Autónoma de Madrid)

Presenter: RODRÍGUEZ, Tomás R. (Universidad Autónoma de Madrid)

Session Classification: Fundamental Symmetries and Interactions