Contribution ID: **240** Type: **Contributed talk**

Stimulated X-rays in resonant atom Majorana mixing

Tuesday 25 July 2017 15:15 (15 minutes)

Massive neutrinos demand to ask whether they are Dirac or Majorana particles.
Majorana neutrinos are an irrefutable proof of physics beyond the Standard Model.
Neutrinoless Double Electron Capture is not a process but a virtual $\Delta L = 2$ Mixing
between a parent ${}^{A}Z$ atom and a daughter ${}^{A}(Z-2)$ excited atom with two electron holes.
As a mixing between two neutral atoms and the observable signal in terms of emitted two-hole X-rays,
the strategy, experimental signature and background are different from neutrinoless double beta decay.
The mixing is resonantly enhanced for almost degeneracy and, under these conditions,
there is no irreducible background from the standard two-neutrino channel.
We reconstruct the natural time history of a nominally stable parent atom
since its production either by nature or in the laboratory.
After the time periods of Atom Oscillations and the decay of the short-lived daughter atom,
at observable times the relevant "stationary" states are the mixed metastable long-lived state
and the short-lived excited state, as well as the ground state of the daughter atom.
Their natural population inversion is most appropriate for exploiting the bosonic nature
of the observed X-rays by means of stimulating X-ray beams.
Among different observables of the Atom Majorana Mixing,
we include the enhanced rate of Stimulated X-ray Emission from the long-lived
metastable state by a high-intensity X-ray beam.
A gain factor of 100 can be envisaged in a facility like European XFEL.

Authors: BERNABEU, Jose (IFIC); Mr SEGARRA, Alejandro (IFIC (U. Valencia - CSIC))

Presenter: Mr SEGARRA, Alejandro (IFIC (U. Valencia - CSIC))

Session Classification: New Technologies

Track Classification: Neutrinos