Contribution ID: **62** Type: **Contributed Talk**

Three-Body Cs(H_2,γ)La Nuclear Synthesis in Cuboctahedron CsH_2Pd_{12}

Thursday, 3 August 2023 15:35 (15 minutes)

S. Oryu, T. Watanabe, and Y. Hiratsuka
Tokyo University of Science, Noda, Chiba 278-8510 Japan

Three-body CsH_2 eigenvalues in a cuboctahedron CsH_2Pd_{12} molecule are calculated in the range from 0.01fm to several ten nano-meter in one stretch, by using 100 significant figure. We utilized five traditional potentials (nuclear Woods-Saxon, three-ion repulsive Coulomb, ion-Pd repulsive Coulomb, electron-ion-Pd effective, nuclear three-body short range) [1] and added a nuclear three-body long range force (3BLF) [2].
The electron's degrees of freedom are frozen for the three-body calculation. However, parameters of electron-ion-Pd effective potential are fitted to energies of $E^{\rm mol}_{\rm gd}$ and $E^{\rm mol}_{\rm 1st}$ which were obtained by the electron based Kohn-Sham equation. Several three-body resonance states are obtained, where the nuclear three-body La resonances strongly interfere with the three-body CsH_2 molecular resonances. We found that the E2 transition times from four ion oscillation (IOS) states $J^\pi = 7/2^+$ to the La ground state $J^\pi = 7/2^+$ are very short with $\tau \approx 10^{-1} \sim 10^{-6}$[sec], for the five traditional potentials and $\tau \approx 10^{-2} \sim 10^{-8}$[sec] for the six potentials. For the the CsH_2 ground state $\tau \sim 10^{24}$[sec] and the first excited state $\tau \sim 10^{4}$[sec] which are very stable. Our ultra-low energy critical values C_{low}= (density)×(energy)×(duration-time)= 7.50×10^5[sec·Pa] $\sim 1.75 \times 10^{10}$[sec·Pa] are almost the same as the critical values of *thermal nuclear fusion*: C_{high}= (density)×(energy)×(duration-time)=1.16×10^6[sec·Pa] or more.

[1] T. Watanabe, Y. Hiratsuka, M. Takeda, S. Oryu, N. Watari, H. Kakigami, I. Toyoda, J. Phys. Commun. {**6**} 045003 (2022).\\
[2] Shinsho Oryu, J. Phys. Commun. {**6**} 015009 (2022).

Primary author: ORYU, Shinsho (Tokyo University of Science)

Presenter: ORYU, Shinsho (Tokyo University of Science)

Session Classification: Thursday Parallel Session: AMO Systems (AudiMax)