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BANGALORE · INDIA

Notice for the PhD Viva Voce Examination

Ms Aswathi V (Registration Number: 1942091), PhD Scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Friday, 04 April 2025 at 3.00 pm in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029, Karnataka, India.

Title of the Thesis : **Theoretical Studies on Photodisintegration of Lithium**

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The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Place: Bengaluru
Date: 26 March 2025

Registrar (Academics)

ABSTRACT

The purpose of this thesis is to present a comprehensive theoretical study on the photodisintegration of lithium at the energies relevant to Big Bang Nucleosynthesis (BBN). The study of photon-induced lithium disintegration reactions is important in the field of nuclear physics and astrophysics. ${}^7\text{Li}$ is considered as one of the elements that was synthesized primordially in the standard Big Bang Nucleosynthesis. Recently several experiments are being carried out at various laboratories to study photodisintegration of lithium to shed light on the nuclear dynamics and also on the abundance of lithium in the early universe. Most of the earlier theoretical studies were model-dependent and some of them were based on effective field theory. Our formalism differs from both and we propose to study this reaction in a model-independent way. It is well known that spin observables provide incisive information with regard to the role of different amplitudes when some of these contributions are small. Our approach, in this thesis, which makes use of irreducible tensor techniques is well suited to make predictions on spin observables as well as on differential cross-section.

Keywords: Lithium photodisintegration, Differential cross-section, Spin observables, Photon polarization, Big Bang Nucleosynthesis

Publications:

1. **Aswathi. V**, Venkataramana Shastri, Shilpashree S. P, Complete analysis of differential cross-section in ${}^7\text{Li} + \gamma \rightarrow {}^6\text{Li} + n$ at astrophysical energies, *Physica Scripta* **99** (2024) 075041, <https://doi.org/10.1088/1402-4896/ad57fd>
2. **Aswathi V**, Venkataramana Shastri, Shilpashree S. P, Lithium photodisintegration with linearly polarized photons at astrophysical energies, *Monthly Notices on Royal Astronomical Society* **526** (2023) 2920 – 2923, <https://doi.org/10.1093/mnras/stad2920>
3. **Aswathi. V**, Venkataramana Shastri, Shilpashree S. P, ${}^7\text{Li}$ photodisintegration with circularly polarized photons, *Springer Proceedings in Physics* **304** (2022) 651, https://doi.org/10.1007/978-981-97-0289-3_149
4. **Aswathi. V**, Venkataramana Shastri, Shilpashree S. P, Lithium photodisintegration with unpolarized photon beams at near threshold energies, *Materials Today: Proceedings* **62** (2022) 5467 - 5470, <https://doi.org/10.1016/j.matpr.2022.04.145>
5. **Aswathi. V**, Venkataramana Shastri Shilpashree, S. P, Model independent approach to photodisintegration of ${}^7\text{Li}$ at the range of energies interest to BBN, *Journal of Physics: Conference Series* **2156** (2021) 012213, <https://doi.org/10.1088/1742-6596/2156/1/012213>