



**S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES**

Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Department of Astrophysics and High Energy Physics

14th October, 2022

3.30 PM

ONLINE/ FERMION

SPEAKER

**Dr. MILAN SIL,
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TITLE OF THE TALK

EXPLORING NOBLE GAS SPECIES IN THE RADIATION-DOMINATED REGION

ABSTRACT

Two noble gas molecular cations, argonium (ArH^+) and hydro-helium or helenium (HeH^+), are discovered toward the two radiation-dominated environments in space: the Crab nebula supernova remnant and the planetary nebula (NGC 7027), respectively. The elemental abundance of neon is lower than helium but higher than that of the argon. However, the neonium cation (NeH^+) is yet to be identified in space. In the Crab nebula supernova remnant, the hydroxyl radical and hydroxyl ion are abundant. But the hydroxyl cations of these noble gases (i.e., ArOH^+ , NeOH^+ , and HeOH^+) are yet to be detected in space. Here, we attempt to model the noble gas chemistry containing hydride and hydroxyl cations of noble gases (ArH^+ , NeH^+ , HeH^+ , ArOH^+ , NeOH^+ , and HeOH^+). We also consider various isotopologs of these hydride and hydroxide cations (^{36}Ar , ^{38}Ar , ^{40}Ar , ^{20}Ne , and ^{22}Ne). The chemical evolution of these species under the diffuse and exotic environment (the Crab nebula filamentary region) is studied (Das et al., 2020). The intrinsic line surface brightness is calculated to find a favorable parameter space that can explain the observational features for the condition suitable in the Crab filamentary region. The possibility of detecting some hydride and hydroxyl cations in the Crab nebula environment is also highlighted.

Reference: Das, A., Sil, M., Bhat, B., et al. 2020, ApJ, 902, 131, doi: 10.3847/1538-4357/abb5fe

HOST FACULTY

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