

EXPLORE 2024 Summer School



Report of Contributions

Contribution ID: 2

Type: **not specified**

Bipradeep Saha: Understanding the role of early stars in galaxy formation and evolution using cosmological simulations

In the Λ CDM cosmological paradigm, smaller objects merge to form larger ones. Stars in galaxies are classified into Population I (PopI), which are metal-rich, and Population II (PopII), which are metal-poor but have higher metallicities than primordial gas. This led to the hypothesis of Population III (PopIII) stars, which are metal-free and the first stars in the universe. Despite extensive searches, no PopIII stars have been observed. These stars form in dark matter halos with masses around $10^6 M_{\odot}$, and their formation is driven by molecular hydrogen cooling, resulting in large characteristic masses.

PopIII stars' stellar radiation ionizes and heats surrounding regions, driving shocks that enrich both the host and nearby halos with metals, promoting PopII star formation. They burn brighter and hotter than metal-rich stars, playing a crucial role in ending the cosmic dark ages and initiating reionization. Understanding PopIII stars is essential for deciphering galaxy origins and early universe processes.

Here, I present a comprehensive model for simulating PopIII stars, incorporating a refined thermochemistry network and detailed spectra calculations, along with a model for PopIII supernova feedback. Using cosmological zoom-in simulations, the study reveals the significant impact of PopIII stars on early galaxy formation, gas content, metal enrichment, and ionization. The findings provide a valuable framework for studying PopIII stars and generating predictions for observations with the James Webb Space Telescope, enhancing our understanding of their role in shaping the early universe.

Session Classification: Invited talk: Numerical Astrophysics - Bipradeep Saha, "Understanding the role of early stars in galaxy formation and evolution using cosmological simulations"

Contribution ID: 3

Type: **not specified**

Prof. Dr. Camilla Hansen: "Dark matter in galaxies via M/L-ratios"

If you have questions about Galfit, you can get in touch with Marcel: Bennedik at iap.uni-frankfurt.de

Session Classification: Invited lecture: Observational Astrophysics –Prof. Dr. Camilla Hansen, "Dark matter in galaxies via M/L-ratios"

Contribution ID: 4

Type: **not specified**

Welcome: Prof. Dr. Laura Sagunski and Prof. Dr. Jürgen Schaffner-Bielich (on behalf of the EXPLORE team)

Session Classification: Welcome: Prof. Dr. Laura Sagunski and Prof. Dr. Jürgen Schaffner-Bielich (on behalf of the EXPLORE team)

Contribution ID: 5

Type: **not specified**

Welcome: Dr. Mohab Abou Zeid (administrative director of ELEMENTS)

Session Classification: Welcome: Dr. Mohab Abou Zeid (administrative director of ELEMENTS)

Contribution ID: 6

Type: **not specified**

GREP-EXPLORE student talk: Muhammad Azeem (York University)

Session Classification: GREP-EXPLORE student talk: Muhammad Azeem (York University)

Contribution ID: 7

Type: **not specified**

GREP-EXPLORE student talk: Karan Alavi (York University)

Session Classification: GREP-EXPLORE student talk: Karan Alavi (York University)

Contribution ID: 8

Type: **not specified**

GREP-EXPLORE student talk: Lauren Morley (York University), "SPHerical Dynamics of Miniquasars and Dark Matter Minihalos"

Session Classification: GREP-EXPLORE student talk: Lauren Morley (York University), "SPHerical Dynamics of Miniquasars and Dark Matter Minihalos"

Contribution ID: 9

Type: **not specified**

GREP-EXPLORE student talk: Zeinab Imani (York University)

Session Classification: GREP-EXPLORE student talk: Zeinab Imani (York University)

Contribution ID: 10

Type: **not specified**

GREP-EXPLORE student talk: Sian McGarva (University of Alberta), "Thermal Effects on Dark Boson Stars: Stellar Structure and Formation"

Session Classification: GREP-EXPLORE student talk: Sian McGarva (University of Alberta),
"Thermal Effects on Dark Boson Stars: Stellar Structure and Formation"