

COMPUTATIONAL RESEARCH in BOSTON and BEYOND SEMINAR

Galactic Archaeology: Investigating Galactic Evolution through Ancient Stars & Galaxies

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ABSTRACT:

Just like traditional archaeologists who study the history of humanity through ancient artifacts, galactic archaeologists study the history of our galaxy through ancient stars and dwarf galaxies that still survive today. This talk will briefly cover several galactic archaeology projects and describe how we are able to use simulations to interpret observations of ancient stars and galaxies.

The motions and chemical composition of the stars currently present in the extended outskirts (the stellar halo) of a galaxy preserve a record of the galaxy's formation history. While most of the stars in the center and disk of a galaxy formed in situ, many of the stars in the stellar halo originated in the many small galaxies that the central host galaxy accreted over billions of years. Currently, though, we lack ways to identify which halo stars originated in which dwarf galaxies or even reliably identify which stars were accreted. By utilizing the Caterpillar simulation suite, a suite of 32 Milky Way-mass galaxies forming, we find that stars with strong enrichment of certain chemical elements (e.g., r-process elements) may have preferentially formed in the smallest dwarf galaxies that merged into the Milky Way. We also quantify how well astronomers can kinematically identify stars that accreted together from these dwarf galaxies. Looking forward, we will expand on this work with several more detailed simulations of dwarf galaxies and how r-process elements mix into interstellar gas.

**FRIDAY, OCTOBER 1, 2021
12:00 PM – 1:00 PM**

<https://math.mit.edu/sites/crib/>

ZOOM MEETING info:

<https://mit.zoom.us/j/96155042770>

Meeting ID: 961 5504 2770