PhD Journal Club

Maggio 2024

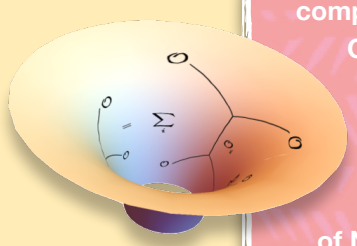
ROMA TRE
UNIVERSITÀ DEGLI STUDI

Speakers

Towards a Lagrangian Double Copy for Supergravity

Valerio Descontus

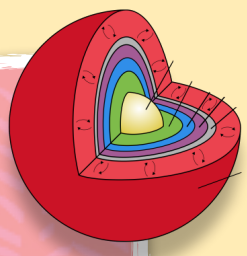
In 2008 Bern, Carrasco and Johansson introduced the so-called Double Copy relations, which are correspondences between gravitational and Yang-Mills theories which allow one to compute tree-level n-graviton amplitudes from tree-level n-gluon ones. These relations provided tremendous simplifications in the computations for graviton scattering, thus allowing for a greater insight on (super)gravitational theories. One of the topics of main interest concerning the Double Copy is the search for a possible Lagrangian origin to the relations, i.e. a possible connection between the Lagrangians of Yang-Mills theories with those of gravitational theories justifying the correspondence found for the amplitudes. In this contribution, we present our strategy for the Double Copy construction of perturbative Lagrangians for gravitational theories by discussing the examples of the free Lagrangians of N=0 Supergravity and of N=1 Supergravity coupled to a chiral multiplet.



Evolution and dust production by AGB stars in Andromeda

Claudio Gavetti

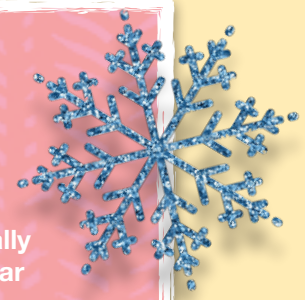
The stars evolving through the Asymptotic Giant Branch (AGB) are generally regarded as highly efficient dust manufactures, owing to the thermodynamic properties of their wind, which prove extremely favourable to the condensation process of gas molecules into solid grains. In this talk, I will describe the dust and mineralogy of the dust formed in the surroundings of this class of stars, outlining the role of mass and metallicity, and the importance of these studies for the characterization of evolved stellar populations in galaxies. In detail, I will focus on one of the most interesting and well investigated galaxies: Andromeda (M31). The scope of this study is to analyze the AGB population of M31, in order to obtain a full characterization of the sources of the progenitors, and the current evolutionary stage and dust production rate.



Estimating the physical properties of the snow cover in Apennines through GPR and FDR

Emanuele Mariani

Data and simulations show significant snow cover reduction due to global warming, especially in the Central Italian Apennines (CIA). The SMIVIA project integrated Synthetic Aperture Radar (SAR) data and in situ measurements to monitor snow cover. This research used Ground Penetrating Radar (GPR) and Frequency Domain Reflectometry (FDR) via Vector Network Analyzer (VNA) to measure snow properties. GPR provided non-invasive data on snow properties and stratigraphy using electromagnetic pulses. FDR used high-frequency signals to estimate dielectric parameters, determining density and water content. Over two winter seasons at two CIA sites, GPR accurately mapped the snow-soil interface and snow thickness, while VNA estimated snow density and water content, showing good agreement with gravimetric measurements, especially for wet snow. Combining GPR and FDR techniques effectively characterized snowpacks and their stratigraphy, essential for validating satellite data.



22 Maggio 2024 h 15:00

Aula C, Dipartimento di Matematica e Fisica