

Appunti di Fisica '25

8 Settembre ore 15:00

Sala seminari, CNR-IPCF

On some features and properties of natural snow

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Snow is an intrinsically metastable material. Since snowflakes are deposited on the ground they agglomerate into grains that undergo continuous morphology changes under the action of external factors like temperature, humidity, wind, debris. Each of the stratified snow layers of a snowpack is characterized by the morphology and size of the constituent snow grains that determine the properties of the layer. Among the latter, the optical reflectivity (albedo) and the density play a relevant role to the life and mechanical stability of the snowpack. Thus, to selectively identify the different snow layers with their properties is relevant to study a snowpack. Using a portable Raman equipment we performed along one year on-field Raman spectroscopy measurements at different places in the Monterosa area (Aosta Valley, Italy) to analyze the layers of different snowpacks. We observed that the fine features of the Raman spectrum of snow are directly correlated with the snow Specific Surface Area. We clearly separate from each other aged snow (made of larger, agglomerated grains, with lower Specific Surface Area value) from freshly deposited snow (made of smaller, oft dendritic grains, with higher values of Specific Surface Area). The presence of an increasing fraction of water in the liquid state, which adds specific features to the Raman spectrum, leads to clear changes in the spectral features of snow. When such features are found in the spectrum of snow at temperatures near the melting point, they are often a precursor of mechanical failure of the snowpack.