THE PHYSICS COLLOQUIUM

Thursday 13 June 2024, 4:00 p.m.
Nijenborgh 4, Lecture Hall 5111.0080

The Galaxy under a high-energy microscope

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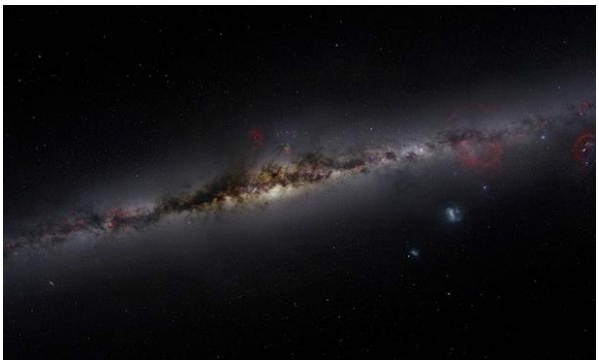
The fate of the Milky Way is in the hands of high-energy, charged particles, so-called cosmic rays. Discovered over a hundred years ago, their origin is still shrouded in mystery. In the past, progress had been hampered by the scarcity of experimental data. Today, however, we are in a position to unravel the origin of cosmic rays thanks to new multi-messenger data.

I will argue that experimental efforts must be guided by state-of-the-art modelling and highlight some examples of recent progress by our group on a variety of physical scales: We have found surprising features in the microscopic interactions of charged cosmic rays with turbulent magnetic fields, making use of methods from quantum field theory and modern computational paradigms like GPUs.

On the intermediate scales of individual sources, cosmic rays can regulate their own transport, and we are employing machine learning to accelerate our numerical models. On the large scales, that is the size of the Galaxy, better spatial information on gas, magnetic fields and star light is needed, and I will review recent progress in reconstructing 3D maps using Bayesian variational inference.



Join us for coffee starting 3:30 p.m. Refreshments will be served after the lecture.

For more information contact the host: Manuela Vecchi (m.vecchi@rug.nl)
Website: http://www.rug.nl/research/vsi/colloquia/