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Type: **Invited talk**

Burgers equation and the Fermi-Pasta-Ulam-Tsingou lattice

Thursday, 24 September 2026 09:30 (30 minutes)

The study of thermalisation in isolated systems was pioneered by Fermi-Pasta-Ulam-Tsingou (FPUT). In this talk I will present a new avenue towards the understanding of thermalisation, the presence of a power-law in the Fourier energy spectrum. A universal scaling exponent is obtained by mapping the FPUT model onto a pair of Burgers equations. Energy is transferred to higher Fourier modes like in “Burgers turbulence”, while “shocks” develop on the lattice. Only at much longer times the system reaches energy equipartition. I will also present recent analytical results enabling the derivation of the average shock-time for general random initial conditions.

References:

- M. Gallone, M. Marian, A. Ponno and S. Ruffo: “Burgers turbulence in the FPUT chain”, Phys. Rev. Lett. 114101 (2023)
- M. Gallone, A. Ponno and S. Ruffo: “Energy cascade and Burgers turbulence in the FPUT chain”, Phys. Rev. E, 054212 (2024)
- M. Gallone, R. Grande, A. Ponno, S. Ruffo and E. Druais: “Random initial data and average shock time in the Fermi-Pasta-Ulam-Tsingou chain”, Phys. Rev. Lett. to be published (2026)

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