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Regular Session:

Speaker: Federico Zullo (DICATAM, Università degli Studi di Brescia, Brescia, Italy & INFN, Milano Bicocca, Milano, Italy)

Collaborator: O. Ragnisco

Title: *The integrable Volterra system and its super-integrability*

Abstract: We present the results contained in three recent works [1]-[3], all published in OCNMP, where it has been shown that the integrable version of the N-species Volterra model, introduced by Vito Volterra in 1937, is indeed maximally super-integrable. This superintegrability property applies as well to the case of infinitely many competing species, either countable or uncountable. It is shown that the model can be reduced to a Hamiltonian system with only one degree of freedom. The particular form the Hamiltonian assumes depend on the parameters of the model. We give different examples by expliciting also the properties of the corresponding dynamics.

References

- [1] M. Scalia, O. Ragnisco, B. Tirozzi, F. Zullo, The Volterra Integrable case. Novel analytical and numerical results, *Open Communications in Nonlinear Mathematical Physics*, ocnmp.13947, Vol.4, pp. 188-211, (2024). <https://doi.org/10.46298/ocnmp.13947>
- [2] O. Ragnisco, F. Zullo, The N-species integrable Volterra system as a maximally superintegrable Hamiltonian system, *Open Communications in Nonlinear Mathematical Physics*, ocnmp.15714 Vol.5, pp. 36-56, (2025). <https://doi.org/10.46298/ocnmp.15714>
- [3] The integrable Volterra system in the case of infinitely many species, either countable or uncountable, *Open Communications in Nonlinear Mathematical Physics*, ocnmp.17363, Vol.6, pp. 15-46, (2026). <https://doi.org/10.46298/ocnmp.17363>