

ABSTRACT SF2A – S20

AUTHOR: Peretti Enrico

TITLE: Particle Acceleration and Multi-Messenger Emission from Astrophysical Outflows: Wind Bubbles and Sub-Relativistic Collimated Jets

ABSTRACT: Astrophysical outflows are ubiquitous across a wide range of scales in the Universe. Regardless of their morphology—ranging from collimated jets to quasi-spherical bubbles—they are characterized by strong shocks and turbulence, which provide efficient sites for the acceleration of high-energy particles.

In this talk, I present models in which diffusive shock acceleration plays a central role in energizing particles within such outflows. I discuss applications to bubbles inflated by young massive stellar clusters, starburst galaxies, ultra-luminous X-ray sources, and ultra-fast outflows in active galactic nuclei, as well as to collimated, sub-relativistic jets from protostars, microquasars, and Seyfert galaxies.

Finally, I outline the associated multi-messenger implications, including the production of high-energy photons, neutrinos, and escaping cosmic rays

COMMENT:

If my contribution is accepted, I will adapt the presentation to the time available. I will either highlight the main features of the acceleration and transport models—focusing on wind termination shocks in bubbles and recollimation shocks in jets—and outline their multi-messenger implications, or provide a more detailed discussion of the broad class of sources to which these models have been applied.

MAIN BIBLIOGRAPHY:

Morlino+[including EP] 2021 – Stellar clusters - <https://arxiv.org/abs/2102.09217>

Peretti+ 2022 – Starburst wind - <https://arxiv.org/abs/2104.10978>

Meliani+[including EP] 2024 – Starburst wind - <https://arxiv.org/abs/2402.01541>

Peretti+2023 – Ultra-Fast Outflows - <https://arxiv.org/abs/2301.13689>

Peretti+2025 – Ultra-Fast Outflows - <https://arxiv.org/abs/2303.03298>

Ehlert+[including EP] 2025 – Ultra-Fast Outflows - <https://arxiv.org/abs/2411.05667>

Le Nagat Neher+[including EP] 2026 – Ultra-Fast Outflows - <https://arxiv.org/abs/2603.08701>

Peretti+2025 – Ultra-Luminous X-ray Sources - <https://arxiv.org/abs/2411.08762>

Peretti+2026 – sub-relativistic collimated jets (Seyfert, Microquasar, Protostar) - <https://arxiv.org/abs/2603.16647>