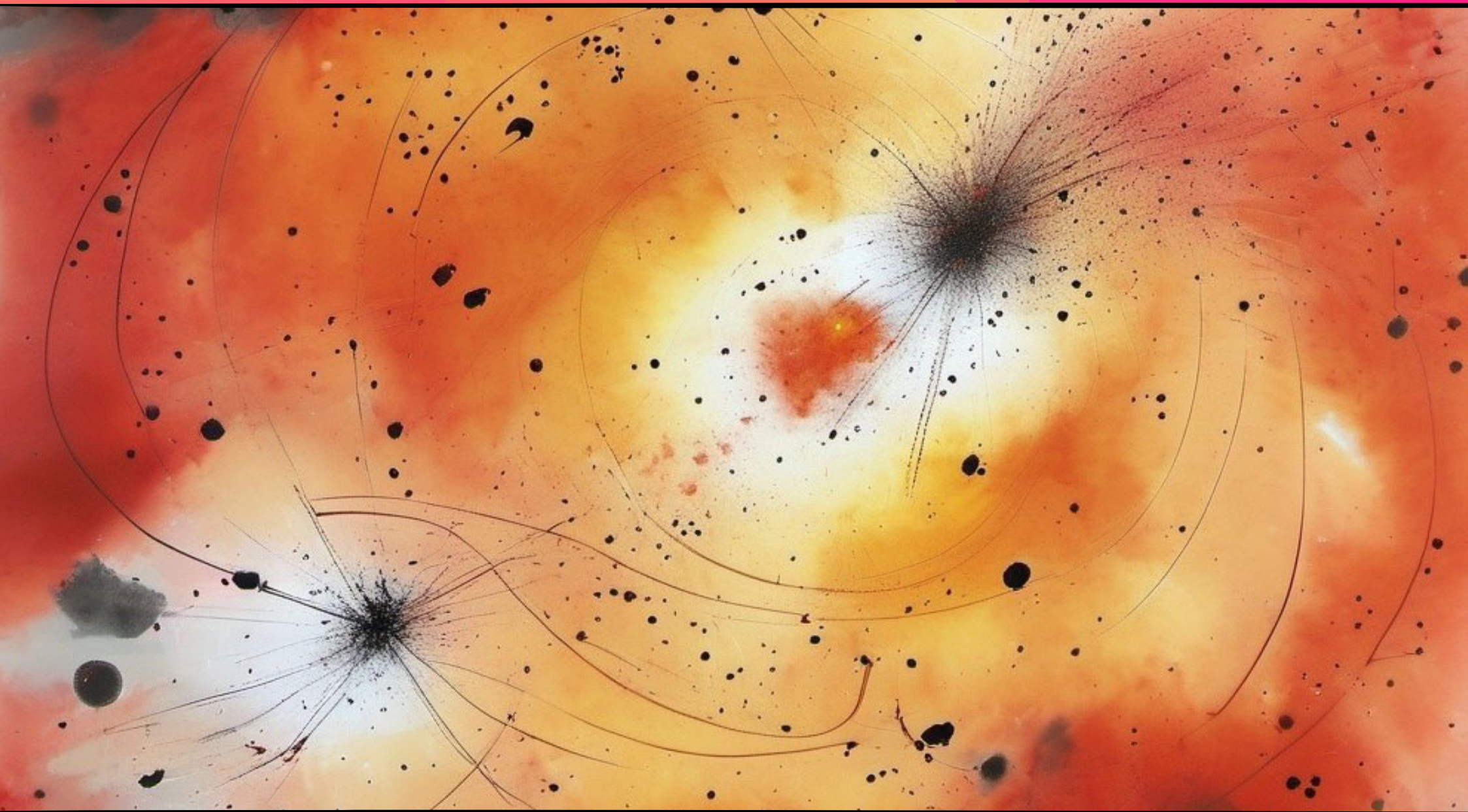


PHYSICS COLLOQUIA 2025



MAR
25

PASQUALE SERPICO | Laboratoire d'Annecy-le-Vieux de Physique Théorique (FRA)

High-Energy Astrophysics: The Importance of Being Opaque

3:00 pm | Classroom A | Via Celoria 16 | Milan

In the recent years, astrophysics has witnessed the opening of the very high-energy gamma-ray and neutrino windows, with detections extending up to the PeV (1000 TeV, or a million GeV) energy scale, that we will briefly present.

However, these new powers are rather short-sighted:

Already at the TeV-scale, the gamma-ray extragalactic sky starts to be opaque to these gamma-rays because of pair production on diffuse photon backgrounds, a phenomenon that eventually attains our Galactic neighbourhood at the PeV.

Together with the low statistics and rather poor angular resolution of neutrino telescopes, these limitations often hamper source identification.

We will discuss how, rather than just being a nuisance, the absorption effect can have an important role for diagnostics of the sources of these gamma-rays and neutrinos, still largely mysterious.

Analogous absorption phenomena should affect the yet-to-be-detected ultra-high energy photons ($E > 10^{18}$ eV):

We will discuss some rather surprising consequences of that, potentially leading to spectacular effects on (putative) powerful ultra-high-energy sources at high-redshift.

If any time is left, some thoughts of the usefulness of these effects in shaping signatures for speculative new physics beyond the standard model will also be mentioned.



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