

FLUKA: status and recent developments

Anna Ferrari on behalf of the FLUKA Collaboration

The FLUKA Monte Carlo radiation transport and interaction code¹ (A. Fassò, A. Ferrari, J. Ranft, P. R. Sala and collaborators, www.fluka.eu) is a leading tool for simulating the interaction of particles with matter across a broad range of applications, including shielding, activation and dosimetry. Its more advanced applications span radiological safety and accelerator design, detector simulation and radiation damage, medical physics, neutronics, neutrino physics, cosmic-ray physics and space radiation.

Over the years, FLUKA has been developed to provide a self-consistent, state-of-the-art approach to simulate particle interactions and transport over an exceptionally wide energy range, from cold neutrons ($\sim 100 \mu\text{eV}$) to the highest-energy cosmic rays (10^{20} eV). To this end, it incorporates sophisticated nuclear and atomic models to accurately transport and interact nearly any electromagnetic, hadronic or neutrino particle, ions included, together with the ability to evaluate and evolve radioactive inventories and the associated dose rates in real time.

This contribution reviews FLUKA developments since the last SATIF workshop, focusing on particle tracking in complex electromagnetic fields, topics related to electron accelerators (synchrotron radiation), hadrontherapy applications, cosmic-ray radiation and astrophysical problems.

¹F. Ballarini et al, “The FLUKA code: Overview and new developments”, *EPJ Nuclear Sci. Technol.* **10**, 16 (2024), <https://doi.org/10.1051/epjn/2024015>.