Wilson Prize--Wakefield Acceleration (WFA) in Laboratories and Beyond

Toshiki Tajima, University of California at Irvine, CA

Wakefields excited by laser or beams of particles are a robustly stable, energetically elevated entity in plasma capable of accelerating particles in high gradients [1]. Since the first laser WFA (LWFA) demonstration in 1994 [2], spectacular experimental developments around the world ensued, showing a variety of possible applications to future high energy accelerators, ultrafast radiolysis, intraoperative radiation therapy, betatron X-ray measurements, etc. LWFA also has driven the peak performance of the CPA laser technology, spawning out High Field Science. We now consider the possibility of X-ray nanotube/crystal wakefield acceleration. Meanwhile, the Mother Nature has far along created (we learned in 2017) astrophysical wakefields that produced gamma bursts in such events as the simultaneous gravitational wave emission from compact objects.

[1] Tajima, T. and Dawson, J.M., *Laser Electron Accelerator*, Phys. Rev. Lett. **43**, 267 (1979).

[2] Nakajima, K., Kawakubo, T., Nakanishi, H., Ogata, A., Kato, Y., Kitagawa, Y., Kodama, R., Mima, K., Shiraga, H., Suzuki, K., Zhang, T., Sakawa, Y., Shoji, T., Nishida, Y., Yugami, N., Downer, M., Fisher, D., Newberger, B., and Tajima, T., *A Proof-of Principle Experiment of Laser Wakefield Acceleration*, Phys. Scripta **T52**, 61 (1994).