Ultrashort Neutron Generation by Coulomb Explosion

Sungmo Nam, Jaemin Han, Duck-Hee Kwon, Yongho Cha, Yongjoo Rhee and Byungchul Lee

Lab. for Quantum Optics, Korea Atomic Energy Research Institute
P.O. Box 105 Yuseong, Daejeon 305-600, Korea
yjrhee@kaeri.re.kr

We are studying a system which can produce high-energy neutrons by the interaction of intense lasers with deuterium clusters and deuterated gases/polymers. The system consists of a reaction chamber with a gas puff nozzle for cryogenically cooled deuterium cluster generation, femtosecond high power laser, focusing optics, neutron detectors, and so on.

Diameter of nozzle orifice is 0.5mm, and the whole nozzle is cooled down to 100°K by a liquid nitrogen jacket. Scintillation detectors for time-of-flight mass spectrometry and CR-39 plastic track detectors are used for neutron detection. Laser beam focusing optics are composed of a f/10 lens and micro-positioning devices.