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Performance of the High Speed Ignitor Pellet Injector*

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— The construction of the four barrel, two-stage pellet injector for the Ignitor experiment, a collaboration between the ENEA Laboratory at Frascati and ORNL, is nearly completed. Initial testing of the ORNL subsystems (cryostat, pellet diagnostics and control system) were carried out with D_2 pellets. New light gate and microwave cavity mass detector diagnostics were developed specifically for this application. The ENEA pneumatic propelling system, which includes innovative pulse shaping valves and uses fast valves in the independent gas removal lines to prevent the propulsion gas from reaching the plasma chamber, was extensively tested in Italy and is ready for shipping to ORNL. The injector will deliver pellets of different sizes with velocities up to 4 km/s, capable of penetrating near the center of the plasma column when injected from the low field side in Ignitor. The new injector could be tested on existing experiments, such as JET. Our simulations show that a pellet of 5 mm in diameter could reach the inner plasma region in an actual 9 keV discharge that had an internal transport barrier.

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