# Pellet Injection in the Stellarator TJ-II

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Cryogenic pellet injection (PI) is a standard tool on most medium- and large-sized magnetically confined plasma devices. Technologies are well developed and PI systems are earmarked as critical items in future reactors. Despite significant progress, a complete comprehension of ablation, enhanced ablation, and particle drift/diffusion remains to be achieved. Indeed, understanding these is essential to improve codes and to optimize fuelling. In contrast, in some devices, other pellet types are also often injected, *e.g.* impurities. Given the similar ablation physics, *etc*., comparative studies may help extend current knowledge.

A cryogenic PI system is used for low-field side injections into the TJ-II, a highly flexible, medium-sized, stellarator. TJ-II is fitted with a wide range of diagnostics, making it a powerful tool for pellet physics studies [1, 2]. Good agreement is found between experimental and predicted profiles (ablation/deposition) when using a new stellarator version of the HPI2 code [3]. For instance, fast-frame imaging of the ablation process finds outward plasmoid drifts that concur with simulations. This has permitted benchmarking HPI2 for W7-X and has provided input for related studies [3]. Moreover, comparative studies, using a TESPEL ($C_8H_8$) system piggybacked to the up-stream end of the TJ-II PI, substantiate the influence of pellet particle mass on plasmoid drift, deposition profile peaking and deposition efficiency [4]. Finally, TJ-II studies reveal a strong penetration depth/fuelling efficiency relationship, and show that $E_r$ changes are consistent with effective ion charge variations and that density fluctuations are strongly reduced over a short time scale immediately after an injection.

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[3] N. Panadero et al., Nucl. Fusion 58 (2017) 026025.
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