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Edge current profile measurements of peeling-like modes at high $\langle j_{edge}/B \rangle$ in PEGASUS[1] M.W. BONGARD, R.J. FONCK, E.T. HINSON, B.T. LEWICKI, A.J. REDD, University of Wisconsin-Madison — Large-scale, coherent, high-m filamentary edge instabilities are routinely observed under conditions of high $\langle j_{edge}/B \rangle$ in PEGASUS. These ELM-like filaments are characterized with high-speed imaging, as well as scanning magnetic and Langmuir probes. Their properties include: low- to intermediate-n; a coherent electromagnetic signature; large poloidal coherence lengths; rotation with the bulk plasma; and explosive detachment from the edge with outboard radial propagation. Stability is sensitive to j_{edge}, with mode drive or suppression dependent on the sign of $\dot{I}_p$. The extremely low $\mathbf{B}$ ($B_{t,0} \leq 0.1$ T) and high $j_{edge} \approx 0.1$ MA/m^2 in PEGASUS lead to high peeling instability drive, proportional to $\langle j_{edge}/B \rangle$, comparable to that achieved in H-mode on larger experiments. However, in PEGASUS j_{edge} is driven by large $\dot{I}_p$ (≤ 50 MA/s) and associated skin currents as opposed to a localized region of high bootstrap current in an H-mode pedestal. A new radial array of Hall-effect sensors measures internal $B_{\theta,edge}(R)$ directly with high spatial and temporal resolution to provide strong experimental constraint on $j_{edge}(\psi)$ in equilibrium reconstructions. Such equilibria may be used to uniquely test predictions of peeling-ballooning stability theory.

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Michael Bongard
University of Wisconsin-Madison

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