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Spectroscopy of Z-pinch plasmas: how atomic and plasma physics merge and unfold new applications¹

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Recent advances in theoretical and experimental work on plasma spectroscopy of Z-pinches are presented. We have shown that the University-scale Z-pinch generators are able to produce plasmas within a broad range of temperatures, densities, opacity, and radiative properties depending on the type, geometry, size, and mass of wire array loads and wire material. The full x-ray and EUV diagnostic set for detailed spatial and temporal monitoring of such a plasma together with relativistic atomic and non-LTE kinetic codes create a very useful and productive environment for the study of atomic and plasma spectroscopy features and development of their applications. A variety of examples of K-shell low-Z (such as Mg and Al), L-shell mid-Z (such as Ni, Cu, and Ag), and M- and L-shell high-Z (W) will be considered and their specific features and applications to fusion and astrophysics will be highlighted.

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