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IFE/P6-17: Axial Magnetic Field Compression Studies Using Gas Puff Z-pinches and Thin Liners on COBRA

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The MagLIF concept proposes to reach fusion parameters by imploding a cylindrical liner onto fusion fuel on the 27 MA Z machine at Sandia National Laboratories. The concept relies on plasma preheating using a laser and magnetic confinement with an axial magnetic field. The success of this scheme depends upon the compression of the magnetic field by the plasma to limit electron losses to the liner. The work presented here addresses magnetic field compression in hydrogen gas puff and thin liner Z-pinches. The principal goal of this research is to understand the development of gas and liner Z-pinch instabilities and investigate the possibility that axial magnetic fields can mitigate them while obtaining the largest possible compression ratios. The axial magnetic field time evolution will be measured using miniature Bdot probes. We will compare experimental results to the newly developed three-dimensional extended MHD PERSEUS code to assess the validity of numerical tools and the importance of the Hall effect in plasma implosion.

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