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3P84 - Design and calibration of magnetic pick-up coil (B-dot) probes for measuring strong magnetic fields using commercial electronic components

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Magnetic fields play an important role in the behavior or many HEDP systems, however, the scaling of astrophysical relevant phenomena to a laboratory setting requires the generation of strong magnetic fields (>5 T) that can match the high flow velocities and energies achieved by the plasmas commonly created in these experiments. Accurate measurement of such powerful magnetic fields and field geometries requires the use of precise and often disposable measuring devices that can be easily adapted to any experiment. Here, we present a method for fabricating B-dot probes using commercially available inductor elements, commonly used in circuit board construction, with a study of the performance in strong (10 T) pulsed magnetic fields used in HEDP experiments. We show that these probes, in addition to being easy and cheap to manufacture, provide accurate and responsive measurements after being properly calibrated, and serve as a robust and reliable method for measuring magnetic fields.

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