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**Design of the DM Radio Toroidal Magnet Cross Section**[1]
ALEXANDER DROSTER, UC Berkeley, DM RADIO COLLABORATION — Dark Matter Radio (DM Radio) will use a toroidal DC magnetic field to probe axion dark matter in the sub-$\mu$eV mass range. In this talk we discuss the design of the toroidal magnets cross section. We conclude that a magnet with a D-shape cross section, similar to that of tokamak fusion reactors, offers the best performance both from the perspective of mechanical properties and for maximizing the predicted axion conversion power. We compare the D-shape design to comparable circular and rectangular cross section designs to quantify the performance advantage of the D-shape for key magnet properties. This study informs the design of the next step in the DM Radio program, DM Radio 50 Liter, which will implement a 50 L toroidal magnet to search for axion dark matter in the $\sim$10 neV to $\sim$1 $\mu$eV mass range.

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