Abstract Submitted
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Observation of Strong Internal Magnetic Field in Laboratory Simulations of Coronal Loops[1] S.K.P. TRIPATHI, P.M. BELLAN, Caltech — Solar coronal loops have been simulated in a Caltech laboratory experiment using a magnetized plasma source. The laboratory plasma loops are formed in three steps; namely, application of an arched vacuum magnetic field spanning both electrodes, injection of neutral gas through orifices on each electrode, and application of high voltage between the electrodes. The foot-points of the loops on the orifices are separated by 8 cm. Visual images of the dynamical evolution of the laboratory loops are recorded using a digital framing camera. A loop probe array measures all three components of the magnetic field at four distinct locations. Our new result is the observation of a strong magnetic field carried by the plasma loop as it propagates away from the electrodes. Within 5 μs the loop expands $\sim$ 16 cm away from the electrode. Thereafter, the loop magnetic field ($\sim$ 500 G) is measured to be more than two orders of magnitude larger than the pre-existing vacuum magnetic field at the apex of the loop. We also plan to present results showing the deviation of the measured magnetic field from the calculated force-free magnetic field.

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