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High-resolution, 3D mapping of the strapping field for the Caltech Solar Coronal Loop Experiment PATRICIO ARRANGOIZ, BAO HA, PAUL BELLAN, California Institute of Technology — The Caltech Solar Coronal Loop experiment is designed to produce laboratory prominences whose qualitative behavior is scalable to the solar regime. The expansion instability of these plasma loops, often called the torus instability, is attributed to a background magnetic field that straps down the plasma by means of a $\mathbf{J} \times \mathbf{B}$ force. The strapping field profile in the direction of the loop radius can be described by a global power-law dependence with a characteristic exponent. This decay index n must exceed a threshold for the instability to develop. A novel coil setup in the final stages of construction is expected to produce a field with these properties. Here, we present a diagnostic system designed to systematically map both the background and plasma magnetic fields. The former is mapped via custom-built 3-axis Hall sensors with adjustable (x, y, z)-position and the latter via a 4-channel, 3-axis B-dot probe. Efficient data visualization techniques are also being developed concurrently. These will in principle allow us to study the relationship between the field profiles and the onset of the instability, complementing recent analytical and numerical treatments.

Paul Bellan
California Institute of Technology

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