

Abstract Submitted
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Large Reconnection Experiment (LRX): A Major Next-Step for Laboratory Studies of Magnetic Reconnection HANTAO JI, MASA AKI YAMADA, STEWART PRAGER, PPPL, WILLIAM DAUGHTON, LANL — A new large plasma experiment, called the Large Reconnection Experiment or LRX, has been proposed to study magnetic reconnection in regimes directly relevant to fusion, space, and astrophysical plasmas. There are at least two possibly coupled mechanisms to explain why reconnection is fast as compared to the MHD predictions: one by physics beyond MHD, and the other by breakdown of the MHD current sheet via plasmoid instabilities into a state of interacting flux ropes. However, the former works only on the ion scales, much smaller than the plasma size, while the latter is only predicted theoretically. Further progress to study these is currently impeded by several severe limitations (1) in realistic simulations (especially in 3D), (2) in space observations due to a small numbers of in-situ measurements, (3) in solar observations due to limited spatial resolution of remote-sensing techniques, (4) in fusion plasmas due to the limited diagnostic accessibility, and (5) in the existing basic laboratory experiments due to limited scale separations. All of these strongly motivate the well-controlled/diagnosed, collaborative LRX project to simultaneously achieve large scale separations and high Lundquist numbers. Major questions and conceptual design for the LRX project will be discussed.

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