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Possibility for a New Measurement of the Proton Elastic Form Factor Ratio at Very Low $Q2$ G. RON, E. PIASETZKY, Tel Aviv University, R. GILMAN, Rutgers University — The proton form factors at low Q^2 encode information about the peripheral structure of the proton as well as the interplay between the magnetic and electric charge distributions [1]. Furthermore, low Q^2 form factor measurements impact high precision experiments, for example, the measurement of the hydrogen hyperfine splitting [2]. Polarization transfer and beam target asymmetry measurements [3,4] allow determination of the electric to magnetic form factor ratio with unprecedented precision down to $Q^2 \simeq 0.15$ GeV^2. A new approved experiment at JLab will extend the Q^2 range down to 0.015 GeV^2. At even lower Q^2 the beam-target asymmetry method is impeded by the need to detect either a very forward electron or to use a low energy beam which must traverse the high magnetic field of a polarized target. We suggest an alternative measurement using colliding proton and electron beams which will allow a measurement of the form factor ratio to extremely low Q^2 ($\sim 10^{-4}$ GeV^2). The opportunity for this measurement will be discussed.

References: [1] G. A. Miller, E. Piasetzky and G. Ron, Phys. Rev. Lett. **101**, 082002 (2008). [2] A. C. Zemach, Phys. Rev. **104**, 1771 (1956). [3] C. B. Crawford *et al.*, Phys. Rev. Lett. **98**, 052301 (2007). [4] G. Ron *et al.*, Phys. Rev. Lett. **99**, 202002 (2007).

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