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**Bremsstrahlung in Low-Energy Lepton-Proton Scattering** PULAK

TALUKDAR, Dept. Physics, Indian Institute of Technology Guwahati, 781039 Assam, India, FRED MYHRER, Dept. Physics and Astronomy, University of South Carolina, Columbia, SC 29208, USA, UDIT RAHA, Dept. Physics, Indian Institute of Technology Guwahati, 781039 Assam, India — We calculate the cross section for the lepton-proton bremsstrahlung process  $l + p \rightarrow l' + p + \gamma$  in effective field theory. This process corresponds to an undetected background signal for the proposed MUSE experiment at PSI. MUSE is designed to measure elastic scattering of low-energy electrons and muons off a proton target in order to extract a precise value for the proton's r.m.s. radius. We work in the flavor SU(2) version of the Heavy Baryon Chiral Perturbation theory. Lepton mass is systematically included in all our expressions. We use Coulomb gauge, which means that the proton does not radiate at lowest order in our calculation. We show that the commonly used *peaking approximation*, which is used to evaluate the *radiative tail* for the elastic cross section, is not applicable for muon proton scattering at the low-energy MUSE kinematics. We discuss how the *radiative tail* cross section depends on the outgoing lepton's momentum and how the lepton mass crucially influence the shape of the radiative tail originating from the elastic peak. We also correct a misprint in a commonly cited review article.

Fred Myhrer  
Univ of South Carolina

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