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The Transition to Hard Scattering: Using the SLAC 8 GeV Spectrometer to Probe Nucleon Structure, 1969-1974 MICHAEL RIORDAN, University of California, Santa Cruz — The year 2019 can be viewed as the 50th anniversary of the discovery of quarks, as two pivotal papers on deep-inelastic electron-proton scattering were published in Physical Review Letters that October. But it took another five years before the physics community became fully convinced that quarks existed. A pivotal detector involved in this discovery process was the SLAC 8 GeV Spectrometer facility, on which I performed my MIT Ph.D. and postdoctoral research. Unlike the 20 GeV Spectrometer used in the initial inelastic electron-scattering experiments, it could readily roll out to large angles and detect electrons that had scattered at high momentum transfers q-squared, enabling experimenters to test and confirm the structure-function scaling predictions of Bjorken and Feynman which proved crucial in verifying the suggested point-like nucleon substructure. This highly flexible detector allowed physicists their first detailed look at the new hard-scattering regime discussed by Andrew Pickering in his 1984 book "Constructing Quarks." If time permits, I will discuss the use of this spectrometer in separating the two nucleon structure functions W1 and W2 and, equivalently, determining the ratio R = sigma(L)/sigma(T), which was the subject of my Ph.D. thesis and later research.

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