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Polyelectrolyte Solutions

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Pierre-Gilles de Gennes once described polyelectrolytes as the “least understood form of condensed matter”. In this talk, I will describe the state of the polyelectrolyte field before and after de Gennes’ seminal contributions published 1976-1980. De Gennes clearly explained why electrostatic interactions only stretch the polyelectrolyte chains on intermediate scales in semidilute solution (between the electrostatic blob size and the correlation length) and why the scattering function has a peak corresponding to the correlation length (the distance to the next chain). Despite many other ideas being suggested since then, the simple de Gennes scaling picture of polyelectrolyte conformation in solution has stood the test of time. How that model is used today, including consequences for dynamics in polyelectrolyte solutions, and what questions remain, will clarify the importance of de Gennes’ ideas.