

CEA - Saclay 91191 Gif-sur-yvette Cedex  
**Service de Physique de l'Etat Condensé**  
SÉMINAIRE

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Orme des Merisiers SPEC Salle Itzykson, Bât.774

**Saffman-Taylor instability for viscoelastic fluids: from  
viscous fingering to elastic fractures**

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Saffman-Taylor instability arises when a fluid is pushed on to a more viscous fluid between closely spaced parallel plates. The interface between the fluids develops a hydrodynamic instability leading to the formation of fingerlike patterns. If the invaded fluid is a complex fluid (as polymer solutions, clays, foams, etc.) one sometimes observes unexpected fracturelike patterns. Very little is known about the origin of those fractures, and a general physical explanation of fracture nucleation is lacking. I will present a study of the linear stability of an air front pushing on a model viscoelastic fluid inside a Hele-Shaw cell. The linear growth rate of a small initial perturbation is found to diverge above a pressure threshold, and experiments prove that this divergence is associated to a fracturelike pattern instability of the interface. This provide an hydrodynamic insight of fracture rise.

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