1057-74-79 **Michel Jabbour*** (jabbour@ms.uky.edu), Department of Mathematics, University of Kentucky, Lexington, KY 40506, and **Paolo Cermelli** (paolo.cermelli@unito.it), Department of Mathematics, University of Turin, Via Carlo Alberto, 10, 10123 Torino, Italy. *On the stability of epitaxial growth in the step-flow regime.*

Recent experiments have established that one- and two-dimensional instabilities, bunching and meandering, coexist during step-flow growth, in contrast to the predictions of the standard Burton-Cabrera-Frank model. In this talk, an alternative theory is presented that captures these observations. A main ingredient is the step chemical potential for which a generalized Gibbs-Thomson relation is variationally derived, resulting in boundary conditions along step edges that couple adjacent terraces. Specialization to the case of a periodic train of steps reveals a competition between the stabilizing Ehrlich-Schwoebel kinetics and a destabilizing energetic correction that, for sufficiently high adatom equilibrium coverage, leads to step collisions. The underlying physics can be understood in terms of the tendency of the crystalline surface to minimize its total grand canonical potential. (Received January 08, 2010)