Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Entropic pulling: how Hsp70 chaperones translocate proteins through membrane pores PAOLO DE LOS RIOS, Ecole Polytechnique Federale de Lausanne - EPFL, ANAT BEN-ZVI, Northwestern University, OLGA SLUTSKY, ABDUSSALAM AZEM, Tel Aviv University, PIERRE GOLOUBINOFF, University of Lausanne — Hsp70s are highly conserved ATPase molecular chaperones mediating the translocation of proteins across membranes and the active unfolding and disassembly of stress-induced protein aggregates. Here, we introduce a mechanism named *entropic pulling*, based on entropy loss due to excluded volume effects, by which Hsp70 molecules can convert the energy of ATP hydrolysis into a force capable to drive the translocation of polypeptides into mitochondria. Entropic pulling represents a possible solution to the long-standing debate between the *power-stroke* and the *Brownian ratchet* models for Hsp70-mediated protein translocation across membranes. Moreover, in a very different context devoid of membrane and components of the import pore, the same physical principles apply to the forceful unfolding, solubilization and assisted native refolding of stable protein aggregates by individual Hsp70 molecules, thus providing a unifying mechanism for the different Hsp70 functions.

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Date submitted: 16 Jan 2006 Electronic form version 1.4