Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Feasibility of Large Free-standing Liquid Films in Space[1] RUI ZHENG, THOMAS WITTEN, James Franck Institute and Department of Physics, University of Chicago — We consider the feasibility of large-scale free-standing thin liquid film experiment in the space environment as a new realization to study two-dimensional hydrodynamics. We identify material and environmental criteria necessary to avoid freezing, evaporation, chemical degradation, and spontaneous collapse of the film. These criteria pose no obstacles to achieving films of kilometer scale and lifetime of many months, with attainable Reynolds number up to 10^7. However, impacts from meteoroids pose a serious threat to the film, and require substantial shielding or unproven self-healing properties in the film. Current theoretical and experimental studies of two-dimensional turbulence are briefly reviewed. We also describe a specific candidate liquid for the film.

[1]Supported in part by the National Science Foundation's MRSEC Program under Award Number DMR-0213745

Rui Zheng
James Franck Institute and Department of Physics, University of Chicago

Date submitted: 19 Nov 2006 Electronic form version 1.4