

Subject: MSD Colloquium, Thurs, Nov. 16, 11am, 200, Auditorium
From: Janice Coble <coble@msd.anl.gov>
Date: Thu, 26 Oct 2006 08:51:47 -0500
To: msd@anl.gov

SPEAKER: DR. ALEXEY SNEZHKO
Argonne National Laboratory

TITLE: "Externally Driven Magnetic
Granular Ensembles: Novel
Dynamics and Self-Organization"

DATE: Thursday, November 16, 2006

TIME: 11:00 a.m.

PLACE: Building 200, AUDITORIUM

HOST: Maria Iavarone

Refreshments will be available at 10:45 a.m.

Abstract: Large ensembles of interacting particles subject to an external forcing often exhibit unexpected nontrivial collective behaviors. Pattern formation, aggregation phenomena and novel collective dynamics in sub-monolayers of magnetic microparticles subject to external alternating electromagnetic fields will be discussed. Depending on the excitation parameters a rich variety of structures such as clusters, rings, chains and networks can be generated in the sub-monolayer of magnetic particles on the flat solid surface. Remarkable nontrivially ordered dynamic self-assembled structures ("magnetic snakes") are formed in the ensemble of magnetic microparticles suspended on the liquid/air interface in a certain range of excitation parameters. These structures emerge as a result of the collective interactions between the particles oscillations generated by an external magnetic field and induced surface waves of the liquid. Self-assembled snakes have a complex magnetic ordering. The segments of the snake exhibit long-range antiferromagnetic ordering mediated by the surface waves, while each segment is composed of ferromagnetically aligned chains of microparticles. The mechanism of the pattern formation and nontrivial magnetic properties of the generated dynamic self-organized patterns will be discussed.