

PHYSICS COLLOQUIUM, partially funded by the GSFEI

PAUL CHAIKIN, Princeton University

“TRILLIONS OF QUANTUM DOTS, FINGERPRINTS,
NANOLITHOGRAPHY WITH DIBLOCK COPOLYMERS,
ANNEALING AND ALIGNMENT OF STRIPED AND
HEXATIC PHASES”

Monday, May 17, 2004

4:00 P.M., Ronald Geballe Auditorium, A-102, PAA
Reception at 3:45 P.M. in the lobby

Abstract: We have been using monolayer films of cylindrical and spherical phase diblock copolymers to make ultra dense patterns over wide areas on arbitrary substrates. For example we cover a three inch wafer with ~ 3 trillion posts, holes, etc. spaced by ~ 25nm, to make quantum dots (for semiconductor lasers), metal particles and wires (for UV polarizers) In trying to understand how the polymer patterns order we have used atomic force microscopy (AFM) to image the cylindrical phase which lies flat on a substrate. The patterns look like fingerprints and Benard rolls and the coarsening (annealing) law we observe is $t^{1/4}$ as in previous studies of these striped phases. This law remained unexplained for decades. However, guided by previous studies of fingerprints and their defects we made time lapse AFM movies which show that the annealing dynamics is governed by the attraction of disclination PAIRS, quadrupoles, rather than simple +/- annihilation. This directly provides an explanation for the alignment of the striped patterns as a function of time. Thus these systems, while aimed at technological and fundamental electronic applications are also ideal materials for studying the dynamics and thermodynamics of ordering in two dimensions. Recently we have shown that simple shear can lead to ordering of these nanometer patterns on centimeter and larger scales.

Tuesday, May 18, 2004

CENPA Seminar

11:00 A.M., CENPA Conference Room, NPL

Karsten Heeger, Lawrence Berkeley National Laboratory
“MEASURING 0-13 WITH REACTORS AND THE SEARCH FOR
LEPTONIC CP VIOLATION”

Particle Theory Seminar

2:30 P.M., Rm. C-421, PAT

Josh Erlich, UW Physics
“SMALL N FROM LARGE N: GAUGE THEORIES FROM MATRIX
MODELS”

Final Exam

3:30 P.M., CENPA Conference Room, NPL

Hans Pieter Mumm, UW Physics
“A TEST OF TIME REVERSAL VIOLATION IN NEUTRON BETA
DECAY”

Condensed Matter Seminar

4:00 P.M., Rm. C-421, PAT

Paul Chaikin, Princeton
“TRIPLET SUPERCONDUCTIVITY AND NONFERMI LIQUID
BEHAVIOR IN ORGANIC CONDUCTORS”

Thursday, May 20, 2004

EPE Seminar

4:00 P.M., Rm. C-471, PAT

Gordon Watts, UW Physics
“RECENT RESULTS FROM D0”

Astronomy Colloquium

4:00 P.M., Ronald Geballe Auditorium
Rm. A-102, PAA

Walt Harris, UW Department of Earth & Space Sciences
“REMOTE SENSING OF FAINT, EXTENDED UV EMISSION LINE
SOURCES WITH SPATIAL HETERODYNE SPECTROSCOPY”

Friday, May 21, 2004

Final Exam

10:00 A.M., Rm. C-520, PAT

Jana Strasburg, UW Physics
“CHARACTERIZATION OF AVALANCHE PHOTODIODE ARRAYS
FOR TEMPORALLY RESOLVED PHOTON COUNTING”

Particle Theory Seminar

12:30 P.M., Rm. B-042, PAB

Shiraz Minwalla, Harvard
TBA

General Exam

1:30 P.M., Rm. C-520, PAT

Manu Forero, UW Physics
“MOLECULAR FINGER TRAPS: UNDERSTANDING ADHESIVE
INTERACTIONS THAT STRENGTHEN UNDER FORCE”

Science Forum Colloquium

3:30 P.M., Ronald Geballe Auditorium
Rm. A-102, PAA

Ann Nelson, UW Physics
“BEYOND NEWTON AND EINSTEIN: MODERN THEORIES OF
GRAVITY AND THEIR EXPERIMENTAL TESTS”

SEMINARS
May 17-21, 2004