Physics 6991: Introduction to Research in Physics and Astronomy

Fall 2017

M 16:00-17:00, Room 245, Physics Building

This is a 1 credit course. Incoming graduate students are introduced to the research opportunites in the Department of Physics and Astronomy. Presentations will be given by members of the faculty and each will indicate some recent research papers from their groups that students should read before attending the presentation. Some presentations will include visits to labs in the physics building.

Professor: Professor and Chair David Cinabro (139 Physics, 313-577-2918, david.cinabro@wayne.edu, http://motor1.physics.wayne.edu/cinabro.html)
Office Hours: M 15:00-16:00 or by appointment

Weekly Write-Ups (100%)

Students are required to submit a weekly one page summary of the research topic presented the previous week. The last summary is due on 17:00 on 18 December.

Day By Day in Class

Week	Topic	Presenter	Paper Link
11 Sep	Physics and Astronomy Research at Wayne State	Professor Cinabro	-
18 Sep	The Phase Diagram of Nuclear Matter	Professor Llope	Ultrarelativistic heavy-ion collisions: exploring the phase diagram of QCD
25 Sep	Single molecule to Multi-molecule ensemble	Professor Sakamoto	R1 motif is the major actin-binding domain of TRIOBP-4 Actin structure-dependent stepping of myosin 5a and 10 during processive movement Coupling of two non-processive myosin 5c dimers enables processive stepping along actin filaments The actin-bundling protein TRIOBP-4 and -5 promotes the motility of pancreatic cancer cells Effect of N-Terminal Extension of Cardiac Troponin I on the Ca(2+) Regulation of ATP Binding and ADP Dissociation of Myosin II in

			Native Cardiac Myofibrils
2 Oct	How Big is the Proton?	Professor Paz	-
9 Oct	Measuring Susceptibility from MRI	Professor Norman Cheng	Limitations of calculating field distributions and magnetic susceptibilities in MRI using a Fourier based method Magnetic moment quantifications of small spherical objects in MRI Susceptibility and size quantification of small human veins from an MRI method A quantitative study of susceptibility and additional frequency shift of three common materials in MRI Quantifications of in vivo labeled stem cells based on measurements of magnetic moments
16 Oct	QCD in extreme: relativistic nuclear collisions	Professor Voloshin	Global Λ hyperon polarization in nuclear collisions: evidence for the most vortical fluid Azimuthally differential pion femtoscopy in Pb-Pb collisions at $\sqrt{s_{NN}}$=2.76 TeV Chiral Magnetic and Vortical Effects in High-Energy Nuclear Collisions --- A Status Report Testing the Chiral Magnetic Effect with Central U+U collisions Collective phenomena in non-central nuclear collisions
23 Oct	From Spintronics to Topotronics: A Look into the Future of Information Technologies	Professor Matos Abiague	SEMICONDUCTOR SPINTRONICS Two-dimensional van der Waals Materials The Quantum Spin Hall Effect and Topological Insulators Topological Quantum Computation Strange Phenomena in Matter's Flatlands Topological Phase Transitions and Topological Phases of Matter
30 Oct	Nuclear Microscopy- A unique qualitative and quantitative tool to study surfaces and interfaces	Professor Padmanabhan	In situ interface analysis by ion backscattering/channeling technique using a thin window cell Ion implantation and ion beam analysis of MOD deposited oxide films Electrochemical properties of V_2O_5 thin films deposited by spin coating Ferromagnetism in CuO–ZnO multilayers The effect of titanium on the lithium intercalation capacity of V_2O_5 thin films Strong plasmon absorption in InN thin films

6 Nov	Experimental Particle Physics	Professor Harr	-
13 Nov	Theoretical Nuclear Physics	Professor Majumder	-
20 Nov	TBA	-	-
27 Nov	Perspectives on Electron Correlation, Topological Insulators, and Emerging 2D Materials	Professor J. Huang	Topological Insulators Ordering, metastability and phase transitions in two-dimensional systems Electronic properties of two-dimensional systems Spin-Orbit Coupling Effects in Two-Dimensional Electron and Hole Systems
4 Dec	Nanoscale Membrane Curvature Revealed by Polarized Localization Microscopy	Professor Kelly	Membrane curvature at a glance Membrane curvature bends the laws of physics and chemistry A physicist's view of the role of lipids in membrane curvature and fission
11 Dec	The Future of Particle Physics: The Higgs, Dark Matter & the LHC	Professor Shah	Impersonating the Standard Model Higgs Boson: Alignment without Decoupling Complementarity Between Non-Standard Higgs Searches and Precision Higgs Measurements in the MSSM On the Alignment Limit of the NMSSM Higgs Sector NMSSM Interpretation of the Galactic Center Excess MSSM A-funnel and the Galactic Center Excess: Prospects for the LHC and Direct Detection Experiments

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