

PHYSICS COLLOQUIUM, partially funded by the GSFEL

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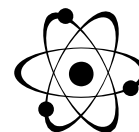
“Brilliant Photon and Particle Beams”

Monday, 4/2

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

Reception at 3:45 P.M. in the lobby

seminars



April 2-6, 2007

Abstract:

The Petawatt-laser PFS (5J/5fs) with 10 Hz repetition rate and a focused intensity of $10^{22}\text{W}/\text{cm}^2$ is setup at the MPQ till 2010. We are actively planning the Exawatt-laser Eli (10J/10fs) with 0.03 Hz and a focused intensity of $10^{26}\text{W}/\text{cm}^2$ in Europe to be built starting in 2010. Via nonlinear relativistic effects the high intensities can be increased much further in a small space-time volume, becoming more efficient the higher the starting intensity. E.g. by coherent harmonic focusing the PFS, its intensity can be focused to $10^{29}\text{W}/\text{cm}^2$ in a small volume (Å^3) for a short time. Extrapolating for the Exawatt-laser $10^{37}\text{W}/\text{cm}^2$ can be reached. A second way for high intensities is building a compact x-fel using an undulator and laser-driven monochromatic electron beam. I show the new techniques to get a GeV electron beam and discuss our table top xfel setup. With such techniques we can reach electrical field strength of $10^{18}\text{-}10^{22}\text{V}/\text{m}$ beyond the Schwinger limit ($1.8 \cdot 10^{18}\text{V}/\text{m}$) where the vacuum becomes unstable against e^+e^- decay. Studying pair decay above or below the Schwinger limit is an experimental challenge. By the strong fields an electron is accelerated with $a = 10^{28}\text{-}10^{32}\text{g}$ resulting in an Unruh temperature of $(100\text{ keV-}1\text{ GeV})/k$. We want to measure the Unruh effect for the first time and study the entangled EPR-photons, which is a new approach to general relativity and quantum mechanics in the laboratory. We also study the Unruh effect for oscillating accelerations.

Tuesday, 4/3

Particle Theory Seminar Neal Weiner, NYU

2:30 P.M., Rm. C-421, PAT “Title TBA”

Chalkboard Club Matt Luzum, UW Physics

5:00 P.M., Rm. C-520, PAT “Heavy Ion Collisions”

Thursday, 4/5

Astronomy Colloquium Steve Federman, University of Toledo

4:00 P.M., Rm. A-102, PAA “Probing Nucleosynthesis Through Interstellar Isotope Ratios”