WEEKLY CALENDAR

Physics & Astronomy

202 Nicholson Hall

Louisiana State University

May 3, 2004

Baton Rouge, LA 70803-4001
http://www.phys.lsu.edu

Tel: (225) 578-2261
Fax: (225) 578-5855

GENERAL SEMINAR

"Coherent Excitonic Matter"

Dr. Peter B. Littlewood

Cavendish Laboratory, Cambridge University

Thursday, May 6, 2004, 3:40 PM in Room 152 Coates

Host: Dr. Ilya Vekhter

Abstract

By shining light on a semiconductor, one creates pairs of electrons and holes that bind together with the Coulomb interaction to make a neutral "atom" called an exciton – the solid state analog of positronium. The possibility that a gas of excitons might undergo Bose-Einstein condensation was raised over 40 years ago, but despite considerable effort and many beautiful experiments, no unequivocal observation has been made.

I will discuss some theoretical ideas and experiments in semiconductor systems, and in particular some novel approaches with optical microcavities that make use of the decay of excitons into photons. In this case, the exciton condensate would be a special kind of laser.

Reminder

Faculty meeting will be held Tuesday, May 4, 2004 in Room 109 Nicholson Hall at 3:40 p.m..

PUBLICATIONS

"Absolute photometric calibration of large aperture optical systems," J.T. Brack, **R. Meyhandan**, G. J. Hofman and **J. Matthews**, Astroparticle Physics 20 (2004) 653-659.

"Properties and performance of the prototype instrument for the Pierre Auger Observatory," AUGER COLLABORATION, J. Abraham, **A. Goodwin**, **J. Matthews**, **M. McEwen**, **R.R. McNeil**, **R. Meyhandan, T. A. Porter**, et. al., Nuclear Instruments and Methods in Physics Research A 523 (2004) 50-95.

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GENERAL SEMINAR

"Radiological Marks for Direct Prostate Dosimetry"

Dr. Erno Sajo
Department of Physics and Astronomy, Medical Physics, LSU

Thursday, May 13, 2004, 3:40 PM in Room 152 Coates
Host: Dr. Juhan Frank

Abstract

Over the last few years, the use of permanent interstitial implants for treating carcinoma of the prostate has sharply increased. In this treatment, tiny pellets, commonly referred to as seeds, containing a radioactive material, are inserted within a tumor containing organ. As many as 50 to 100 individual seeds are often implanted during a typical prostate procedure. An important part of this treatment modality is the post-implant analysis, or how the dose distribution from the actual seed placement conforms to the desired dose to the prostate. Seed placement is determined in the treatment planning phase based on the intricacies of how to deliver the prescribed dose to the prostate while sparing neighboring normal structures. Current methods of post-implant dosimetry invariably rely on the intermediate step of seed localization. The calculation of the dose and dose distribution in the prostate requires accurate knowledge of the location and orientation of each seed. Seed localization relies on modern imaging technology, however, it remains an error-prone procedure: Individual seed locations can be determined with an accuracy of only 3 to 5 mm, and not all seeds can be accounted for. The errors propagate into the dose calculations and have an important impact on the dose estimate. We have developed and patented a new technique for direct post-implant seed dosimetry that does not require explicit information with regard to seed positions and orientations: Trace quantities of a positron emitter may be placed in the seed capsule which in turn is imaged by PET/CT fusion. The measured positron annihilation event distribution may be correlated with the therapeutic dose distribution by an appropriate computational algorithm, and the 3-D dose distribution may be directly obtained from this correlation. This is a marked departure from the philosophy of current methods which require the successful detection of the positions and orientations of seeds on anatomical images, such as CT, before dose calculations can be performed. This way, errors in seed localization and in dose computation will not propagate, and real-time dosimetry for improved seed placement may also become feasible if the method is fully developed.

Congratulations To

Damon Nettles on his promotion to Research Associate 3.

PUBLICATIONS

"Programs for generating Clebsch-Gordan coefficients of SU(3) in SU(2) and SO(3) bases," **C. Bahri**, D. J. Rowe, **J. P. Draayer**, Computer Physics Communications 159 (2004) 121-143.

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