INSTITUT FOR FYSIK OG ASTRONOMI
DET NATURVIDENSKABELIGE FAKULTET
AARHUS UNIVERSITET

IFA – NYT UGE: 20

AMO PHYSICS SEMINAR

Atomic Molecular Optical

C. D. Lin

Department of Physics, Kansas State University, USA

Theory of Dynamic Chemical Imaging with infrared laser Pulses

Time: Monday, May 25, 14.15 to 15.00

Place: Fysisk Auditorium

When an infrared laser pulse interacts with atoms or molecules, electrons which are released earlier may be driven back by the laser field to recollide with the target ions. These recollisions incur the well-known strong field phenomena of high-order harmonic generation (HHG) as well as high-energy above-threshold ionization (HATI) photoelectrons. Since infrared laser pulses with duration of a few femtoseconds are now widely available, it is clear that HHG and HATI spectra can be used to extract the structural change of a transient molecule with temporal resolution of a few femtoseconds in a typical pump-probe setup. Based on the rescattering concept, recently we have established a quantitative rescattering theory (QRS) where the HHG yield can be expressed as the product of a returning electron wave packet with the photo-recombination cross section, and the HATI spectra can be expressed as the product of a similar wave packet with the elastic differential cross sections (DCS) between the target ion with free electrons. The QRS has now been applied to compare with experimental HHG spectra from molecules, from which molecular frame photoionization cross sections can be extracted. The QRS has also been applied to study the HATI spectra extensively to retrieve the DCS of electron-ion collisions. Using the extracted DCS for electron energies in the typical range of the returning electrons, we have shown that the target structure can be retrieved. From the returning electron wave packet, we can also obtain the laser parameters, including pulse duration, peak intensity and carrier-envelope-phase, from the measured HATI spectra.

Peter Staanum and Nicolai Nygaard

Coffee, tea and bread rolls will be served at 14.05

LECTURES ON ENERGY

Title: Towards a carbon free energy supply - scenarios for the future Danish Energy System

Speaker: Anders Bavnhøj Hansen
Energinet.dk

Time: **Tuesday**, 19 May at 3:15 p.m.

Place: Physics Auditorium

Abstract

A long-term vision for a fossil free Danish energy system is frequently discussed on the political scene. This presentation deals with long term scenarios for a Danish energy system, based on renewable energy sources. In the North European region there is a very large potential for offshore wind power. Furthermore on the long timeframe, power production from photovoltage and even wavepower might be available on a big scale.
A very high penetration of this kind of fluctuating power sources will be a major challenge for the power system. Some of the future elements in dealing with this challenge will be presented. The power system has to be highly integrated with the heating, gas and transportation sector to obtain the necessary flexibility to integrate these high amounts of fluctuating power sources.
An integrated production of biofuels, power, heat and gas from biomass could as well be elements in an integrated energy system and will be discussed.
Electric vehicles might be used for balancing short-term fluctuations. Other elements could be international integration of the power system in an offshore power grid and a gas system handling renewable gasses like biogas, hydrogen produced from wind power and other potential gasses of renewable origin.

Coffee/tea and cake will be served at 3 p.m.

The Astrophysical Journal, 695:L97–L102, 2009 April 10 doi:10.1088/0004-637X/695/1/L97

CONSTRAINTS ON HELIUM ENHANCEMENT IN THE GLOBULAR CLUSTER M3 (NGC 5272): THE HORIZONTAL BRANCH TEST*

M. Catelan[1,2,6,7], F. Grundahl[3], A. V. Sweigart[4], A. A. R. Valcarce[1], and C. Cortés[1,5]
[1] Departamento de Astronomía y Astrofísica, Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, 782-0436 Macul, Santiago, Chile
[2] Michigan State University, Department of Physics and Astronomy, 3215 Biomedical and Physical Sciences Bldg., East Lansing, MI 48824, USA
[3] Department of Physics & Astronomy, Aarhus University, Ny Munkegade, 8000 Aarhus C, Denmark
[4] NASA Goddard Space Flight Center, Exploration of the Universe Division, Code 667, Greenbelt, MD 20771, USA
[5] Departamento de Física Teórica e Experimental, Universidade Federal do Rio Grande do Norte, Campus Universitário, 59072-970 Natal, RN, Brazil
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ABSTRACT

It has recently been suggested that the presence of multiple populations showing various amounts of helium enhancement is the rule, rather than the exception, among globular star clusters. An important prediction of this helium enhancement scenario is that the helium-enhanced blue horizontal branch (HB) stars should be brighter than the red HB stars which are not helium enhanced. In this Letter, we test this prediction in the case of the Galactic globular cluster M3 (NGC 5272), for which the helium-enhancement scenario predicts helium enhancements of $\gtrsim 0.02$ in virtually all blue HB stars. Using high-precision Strömgren photometry and spectroscopic gravities for blue HB stars, we find that any helium enhancement among most of the cluster's blue HB stars is very likely less than 0.01, thus ruling out the much higher helium enhancements that have been proposed in the literature.

Key words: globular clusters: general – globular clusters: individual (M3 = NGC 5272, M13 = NGC 6205) – Hertzsprung–Russell diagram – stars: abundances – stars: horizontal-branch

The Astrophysical Journal, 695:L62–L66, 2009 April 10 doi:10.1088/0004-637X/695/1/L62

A LARGE C+N+O ABUNDANCE SPREAD IN GIANT STARS OF THE GLOBULAR CLUSTER NGC 1851*

David Yong[1], Frank Grundahl[2], Francesca D'Antona[3], Amanda I. Karakas[1], John C. Lattanzio[4], and John E. Norris[1]
[1] Research School of Astronomy and Astrophysics, Australian National University, Weston, ACT 2611, Australia; yong@mso.anu.edu.au, akarakas@mso.anu.edu.au, jen@mso.anu.edu.au
[2] Department of Physics and Astronomy, Aarhus University, Denmark; fgj@phys.au.dk
[3] INAF-Osservatorio Astronomico di Roma, via Frascati 33, 00040 Monteporzio, Italy; dantona@mporzio.astro.it
[4] Centre for Stellar and Planetary Astrophysics, School of Mathematical Sciences, Monash University, Victoria 3800, Australia; John.Lattanzio@sci.monash.edu.au
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ABSTRACT

Abundances of C, N, and O are determined in four bright red giants that span the known abundance range for light (Na and Al) and *s*-process (Zr and La) elements in the globular cluster NGC 1851. The abundance sum C+N+O exhibits a range of 0.6 dex, a factor of 4, in contrast to other clusters in which no significant C+N+O spread is found. Such an abundance range offers support for the Cassisi et al. scenario in which the double subgiant branch populations are coeval but with different mixtures of C+N+O abundances. Further, the Na, Al, Zr, and La abundances are correlated with C+N+O, and therefore NGC 1851 is the first cluster to provide strong support for the scenario in which asymptotic giant branch stars are responsible for the globular cluster light element abundance variations.

Key words: Galaxy: abundances – globular clusters: individual (NGC 1851) – stars: abundances

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Rotation of δ Scuti Stars in the Open Clusters NGC 1817 and NGC 7062

J. Molenda-Żakowicz
Astronomical Institute, University of Wrocław, ul. Kopernika 11,
51-622 Wrocław, Poland
e-mail: molenda@astro.uni.wroc.pl
T. Arentoft, S. Frandsen and F. Grundahl
Department of Physics and Astronomy, Danish AsteroSeismology Center (DASC),
Aarhus University, Ny Munkegade 120, Bldg. 1520, 8000 Århus, Denmark
e-mail: (toar,sfr,fgj)@phys.au.dk

Received: February 16, 2009

Theoretical Physics and LTC Seminar

Lundbeck Foundation Theoretical Center for Quantum System Research

Title: Strong and weak localization with Bose-Einstein condensates

Speaker: Peter Schlagheck, University of Regensburg

Time: June 11, 2009 at 14:15

Place: Phys.Aud.

Abstract:

In my talk, I will give an overview on our research activities on atom-laser-like transport processes of interacting Bose-Einstein condensates through dimensionally restricted disorder potentials. For the case of one-dimensional disorder, we find that the interaction between the atoms leads to a crossover from an exponential to an algebraic decrease of the average transmission with the disorder length, which represents a significant deviation from the scenario of Anderson localization. This crossover is correlated with the appearance of permanently time-dependent scattering of the condensate within the Gross-Pitaevskii description of the transport process, and corresponds to strong depletion on a microscopic level. For two-dimensional disorder potentials, we find that the presence of interaction reverts the phenomenon of weak localization and leads to a cone-shaped dip, instead of a peak, in the angle-resolved current of backscattered atoms.

Lars Bojer Madsen

Coffee/tea and cake will be served at 14.00

Information fra administrationen

Fotografering af nye medarbejdere
Foretages nu af **Jens Jacob Iversen**.
Foto-lab vil være åbent tirsdag: 10-11.

Ruth Laursen