Programme of the Eighth European Conference on Atomic and Molecular Physics

6-10 July 2004
RENNES, FRANCE

ECAMP 8 PROGRAMME SUMMARY

	Monday 5	Tuesday 6			Wednesday 7			
09:00		REGISTRATION (from 08:30)			PLENARY LECTURE			09:00
		OPENING SESSION						
		PLENARY LECTURE						
10:00					PLENARY LECTURE			10:00
		COFFEE BREAK						
11:00					COFFEE BREAK			11:00
		Cold atoms and molecules	Clusters and collisions	Symposium on radiation damage in bio-molecules	Photons interactions with atoms and molecules	Applications	PAMO 2004	
12:00								12:00
		EGAS Board Meeting	LUNCH		LUNCH			
13:00								13:00
14:00		POSTER SESSION A			POSTER SESSION A			14:00
15:00	REGISTRATION (until 21:00, see details in the text)						PAMO 2004	15:00
16:00		Cold atoms and molecules	Clusters	Symposium on radiation damage in bio-molecules	Chemistry	Intense lasers		16:00
17:00		COFFEE BREAK			COFFEE BREAK			17:00
18:00		Ions	Cold spectroscopy	Symposium on radiation damage in bio-molecules	Storage rings	PAMO 2004		18:00
19:00	EGAS Board Meeting at Europole							19:00
20:00		RECEPTION AT THE CITY HALL			PUBLIC EVENING LECTURE (21:00)			

INTERNATIONAL AND LOCAL ORGANISATION

ECAMP VIII
A European conference organised by the Atomic and Molecular Physics Division (AMPD) of the European Physical Society (EPS)

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Conference site:
ECAMP 8
Campus Santé, Villejean
Université de Rennes 1
35000 Rennes

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IESL-FORTH, P.O. Box 1527
GR-711 10, HERAKLION, Greece

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Université de Provence
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JP Visticot (Paris)		

REGISTRATION AND CONFERENCE CHECK-IN

Registration and distribution of conference material will start on Monday afternoon. Please read the following carefully to know how to proceed:

1. For those who have reserved accommodation through the FRANTOUR travel agency, registration will take place at the desk of the Hotel or of the Student Residences (CROUS or Agrocampus).

2. For other participants registration will take place in the Main Hall of the Conference Site on Monday afternoon and evening (15:00-21:00) and Tuesday morning (8:30-9:30).
To avoid delays at the registration desk on Tuesday morning, we strongly advise you to register on Monday.

HOW TO REACH THE CONFERENCE SITE

Public transportation

Public transportation in Rennes is either by bus or by metro. The price of a ticket is 1.10 euro and the ticket is valid for one hour on both metro and bus. Maps of the metro and bus routes are available at http://www.star.fr.

From the hotels

The easiest way to reach the Conference Site is by metro (there is only one line).
You should take the direction J.F. KENNEDY. Travel time from the railway station (GARES) to VILLEJEAN-UNIVERSITE is seven minutes.

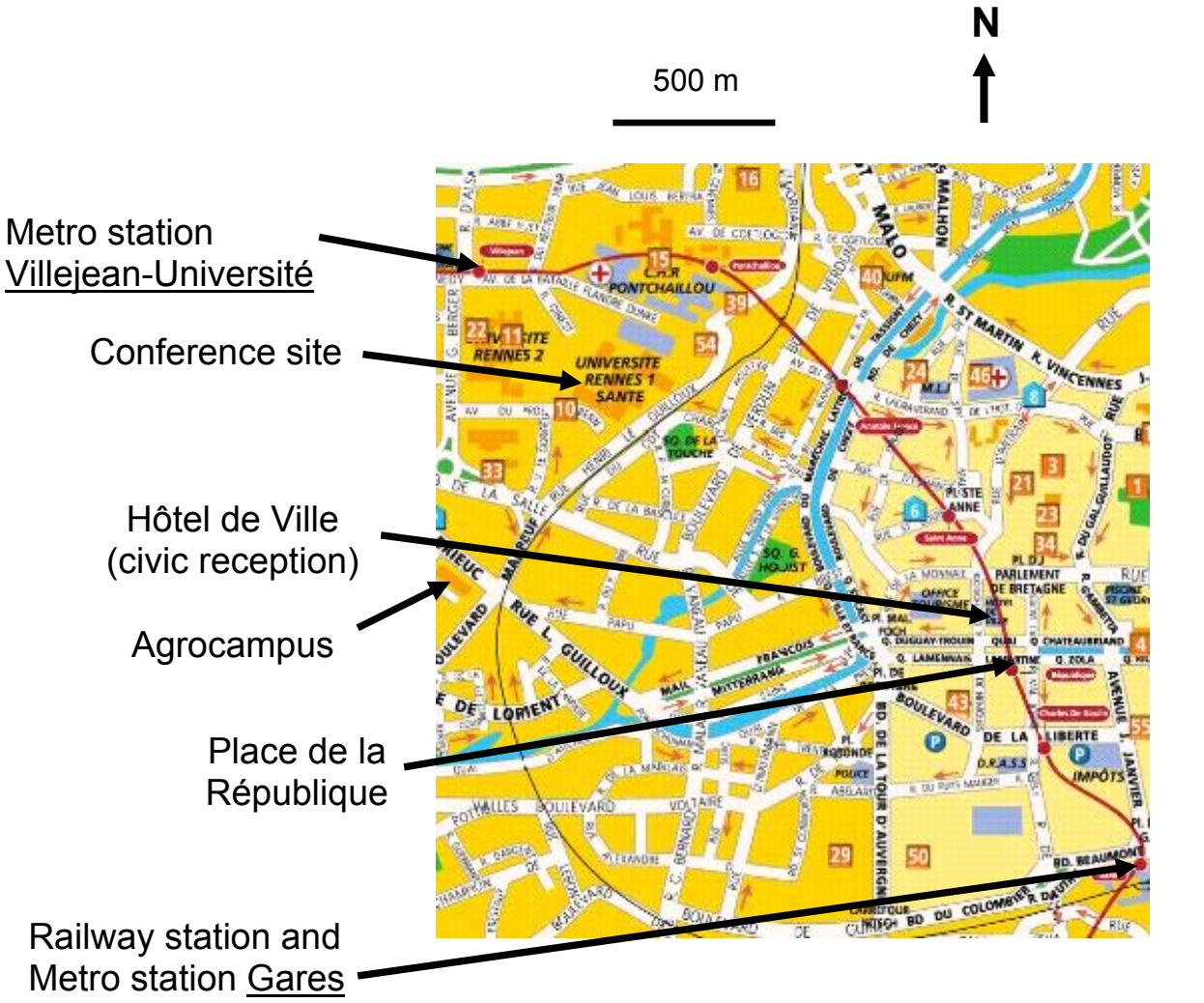
From the Agrocampus

The conference site is about one kilometer on foot (see map). Follow Boulevard Marbeuf, Rue Henri Le Guilloux, and then follow the sign ECAMP 8.

From the CROUS student residences

The conference site is about 500 m on foot (see map). Follow the signs ECAMP 8.

MAPS of RENNES



SOCIAL and ACCOMPANYING PERSONS PROGRAMME

A number of social events are planned during the conference:
A **civic reception** by the Mayor of Rennes will be held at 20:00 on **Tuesday 6th July** in the Hôtel de Ville.
The **Conference Dinner** will be held on the evening of **Thursday 8th July** at the Espace Dugay-Trouin in St. Malo. The conference will end early on Thursday afternoon, and conference participants and accompanying persons will have the opportunity to visit the town of St. Malo before the dinner.
A **public evening lecture** entitled "Physics for Art" will be given by Professor B Brunetti of the University of Perugia on **Wednesday 7th July**.

A number of guided visits of the City of Rennes will be offered throughout the duration of the conference. Guided visits of the Parlement de Bretagne will also be available. The visits last approximately 90 minutes.

On Thursday 8th July, an excursion will be organised for accompanying persons to Dinan, Dinard and finishing at St. Malo for the conference dinner.

A half-day excursion to La Gacilly will be organised in the afternoon of Friday 9th July. La Gacilly is a village of artisans and craftsmen, and is home to a well-known cosmetics company.

There will also be a day-long excursion to Fougères (one of the largest medieval castles in Europe) and Mont St. Michel (approximately 1 hour by coach from Rennes). This excursion will be organised twice: the first will be on Monday 5th July, allowing participants to visit Mont St. Michel without missing part of the conference. The second visit will be on Wednesday 7th July. The visits include a guided tour of the Abbey of Mont St. Michel, which allows visitors to see rooms not open to the general public. The excursions leave at 9:30 from Place de la République (see map).

INTERNET ACCESS

Free Internet access will be provided on the conference site. One room in building 15 and another in building 14 are equipped with PCs. In addition, a wireless network (WiFi) will be installed in the main hall. This is free and can be used with personal laptops equipped with WiFi system.

COFFEE BREAKS

Coffee breaks will be served in the morning and in the afternoon on the Conference Site in the Main Hall and in the Cafeteria.

LUNCH

Lunches will be taken at the University Restaurant Le Métronome which is situated 500 m from the conference site (see map). Admission is by badge, and so participants should make sure that they have this with them at all times.

CONFERENCE DINNER

The **Conference Dinner** will be held on the evening of **Thursday 8th July** at the Espace Dugay-Trouin in St. Malo. Coaches will leave the Conference Site in the early afternoon and participants will have the opportunity to visit St. Malo before the dinner which starts at 19:30.

BREAKFAST

For those who have chosen accommodation at CROUS, breakfast will also be served at Le Métronome from 7:30 to 8:30.
For those who have chosen accommodation at Agrocampus, breakfast will be served at the cafeteria of the Agrocampus from 7:15 to 8:15.

DINNER

For those who have chosen accommodation at Agrocampus, dinner will be served at the restaurant of the Agrocampus.

A buffet dinner will be organised on Monday 5 July, starting at 7 pm in the restaurant situated in building "Cité Riffault".

Dinner on Tuesday 7 July will be served from 9 pm, dinners on Wednesday and Friday will be served from 8 pm. Participants **must show their conference badge**

SCIENTIFIC PROGRAMME

The conference starts at 9:30 on Tuesday 6 July 2004 and will end around 17:00 on Saturday 10 July.

The scientific programme consists of 6 Plenary Sessions (60 min), Review Talks (45 min), Progress Reports, Special Reports (15 min) selected from contributed papers, and two 2-days poster sessions.

One-day symposia on Atoms, Molecules, Optics in Astrophysics and the Environment, on Radiation Damage in Bio-molecules Sciences, as well as PAMO 2004 (bi-annual meeting of the Atomic and Molecular Physics and Optics Division of the French Physical Society) will be held in parallel to the main ECAMP8 sessions.

A special evening lecture on "Physics for Art" will be given by Professor B Brunetti of the University of Perugia on Wednesday 7th July.

Instructions for talks

All oral presentations will be made using the videoprojection system available in each lecture hall.

In order to avoid software compatibility problems, speakers wishing to give a computer presentation are advised to bring their own laptop computer. Alternatively, they may bring their presentation on a CD in which case a copy of their presentation must be sent to secretary@ecamp8.org at least one week in advance so that we can check it is correctly displayed.

Speakers who do not wish to use a computer should print their presentation on ordinary A4 paper, not on transparencies. The lecture halls use a digital camera system with lighting from above to project the page onto the screen, and transparencies can give problems with unwanted reflections.

Speakers presenting a 15 minute Special Report are encouraged to give a paper presentation to avoid losing time connecting their computer. Special Reports have been chosen by the Scientific Committee to draw attention to particular posters, and so questions should be asked during the Poster Sessions.

Poster Contributions

Poster presentations will be organised in two sessions, each lasting two days (2 hours each day after lunch). Session A will be held on Tuesday 6th and Wednesday 7th July, while session B will be on Thursday 8th and Friday 9th July. Posters should be on display during both days of the appropriate session.

The space available for each poster is approximately equivalent to **one A0 portrait page** (width 84 cm, height 119 cm).

Plenary lectures (60') R : Review Talks (45')
P : Progress Reports S : Special Reports (posters selected for oral presentation,15')

Tuesday, July 6, 2004

SESSION 1		Plenary Lecture	Amphi Simon and E
09:45	S Haroche	*Quantum information with atoms and photons: recent experiments and perspectives*	
SESSION 2		Cold atoms and molecules	Amphi Simon
11:15	D Delande	*Multiple scattering of light in cold atoms: from coherent to incoherent transport*	S
11:30	E Luc-Koenig	*Making ultracold molecules with chirped laser pulses*	S
11:45	PWH Pinkse	*Trapping slow dipolar molecules in three and two dimensions using static and switching ...*	S
12:00	A Jurich	*Quantum reflection times and apparent space-shifts for Casimir-van der Waals-potential tails*	S
12:15	VS Melezhik	*Ultracold atom-atom collisions in a non-resonant laser field*	S
SESSION 3		Clusters and collisions	Amphi E
11:15	R Signorell	*Vibrational dynamics of molecular ice particles*	S
11:30	E Campbell	*Coalescence and fragmentation of $(C_{60})_n$ clusters after femtosecond laser excitation*	S
11:45	F Mezdari	*Carbon clusters-atom collisions at intermediate velocity*	S
12:00	P Bicchi	*Rydberg levels excitation via resonant laser assisted collisions in the semiconductor....*	S
12:15	A Dupays	*Muon transfer from muonic hydrogen to heavier atoms*	S
SESSION 4		Symposium on radiation damage in bio-molecules	Amphi A
11:15	L Andersen	*The physics of photo excited bio-molecules*	P
11:40	D Hanstorp	*Bioimaging and optical manipulation*	P
12:05	M Karas	*MALDI: Matrix-assisted laser desorption ionization - a radiation damage becomes .....*	P
SESSION 5		Cold atoms and molecules	Amphi Simon
15:45	J Denschlag	*Bose Einstein condensation of $^6Li_2$ molecules and the BEC-BCS crossover*	R
16:30	J Hutson	*Cold molecules and their interactions*	P
SESSION 6		Clusters	Amphi E
16:00	T Moeller	*Multiple ionization of atoms, molecules and clusers with intense radiation from a vacuum ....*	P
16:30	K Hansen	*Fragmentation and ionisation of atomic clusters (experiment and statistical modelling)*	P
SESSION 7		Symposium on radiation damage in bio-molecules	Amphi A
15:45	JP Schermann	*Combining infrared spectroscopy and mass spectrometry for molecules of biological .....*	P
16:10	BM Fischer	*Interaction between far-infrared electromagnetic radiation and molecular systems*	P
16:35	T Schlatholter	*Ionization, excitation and fragmentation of nucleobases by multiply charged ions*	P
SESSION 8		Ions	Amphi E
17:30	AV Solov'yov	*Possibilities of novel radiation sources using relativistic particles: from atoms up to crystals*	P
18:00	G Gribakin	*Many-body quantum chaos and enhancement of electron recombination with multicharged...*	P
18:30	V Ostrovsky	*Intrashell dynamics of a Rydberg atom: theory and experiment*	P
SESSION 9		Cold spectroscopy	Amphi Simon
17:30	P Villarreal	*Raman spectra simulations of simple dihalogen molecules surrounded by boson/fermion....*	P
18:00	C Adams	*Solitons, vortices and sound in dilute Bose-Einstein condensates*	P
18:30	A Pashov	*Atomic cold collisions studied by molecular spectroscopy*	P
SESSION 10		Symposium on radiation damage in bio-molecules	Amphi A
17:30	M Folkard	*Radiation damage in bio-molecular systems*	P
17:55	E Illenberger	*Probing bio-molecules with slow electrons*	P
18:20	P Scheier	*Dissociative electron attachment to biologically relevant molecules*	P

Wednesday, July 7, 2004

SESSION 1		Plenary lectures	Amphi Simon and E
09:00	G Meijer	*Manipulating polar molecules with electric fields*	
10:00	F Merkt	*Ultrahigh resolution spectroscopy of high Rydberg states*	
SESSION 2		Photon interactions with atoms and molecules	Amphi Simon
11:30	L Dinu	*Photodetachment and photodissociation of O_2^-*	S
11:45	JC Delagnes	*Propagation of femtosecond pulses in an optically thick medium: observation and control*	S
12:00	JL Sanz-Vicario	*Photodetachment of three-electron negative ions*	S
12:15	A Rudenko	*Ionisation dynamics in ultrashort laser pulses : coincident recoil ion – electron.....*	S
12:30	D Dowek	*Circular dichroism in molecular frame photoelectron emission from space fixed ...*	S
SESSION 3		Applications	Amphi E
11:30	E Mariotti	*Magnetometry based on coherent population trapping*	S
11:45	LF Constantin	*High resolution terahertz spectroscopy of species of astrophysical interest*	S
12:00	A Stepanov	*Prebiotic evolution on interstellar dust grains*	S
12:15	S Eden	*Electron-loss and target ionisation cross sections for water vapour by 20-150 keV ...*	S
12:30	A Bergner	*Infrared microscopy of living cells using a CW optoparametric oscillator*	S
SESSION 4		PAMO 2004	Amphi A
11:30	J Vigué	*Atom interferometry*	R
12:15	P Lemonde	*Laser cooled microwave and optical atomic clocks*	P
SESSION 5		Chemistry	Amphi E
15:15	A Ekers	*Autler-Townes effect as a novel tool for the characterization of excited molecular states*	R
16:00	L Serrano-Andrés	*Quantum chemistry for the excited state: methods and applications*	P
16:30	L Banares	*Recent progress in reaction dynamics of elementary abstraction and insertion reactions*	P
SESSION 6		Intense lasers	Amphi Simon
15:15	C Keitel	*Relativistic quantum dynamics in ultra-intense laser pulses*	R
16:00	H Rottke	*Strong field non-sequential double ionisation: the effect of molecular structure*	P
16:30	Y Silberberg	*Narrow transitions, broad light: coherent control with femtosecond pulses*	P
SESSION 7		PAMO 2004	Amphi A
14:45		PAMO General Assembly	
15:30	C Joblin	*Interstellar macromolecules and nanograins: observations and laboratory experiments*	P
16:00	P Bouyer	*Atom laser : a coherent source for atom interferometry*	P
16:30	H Merdji	*Attosecond synchronization of soft X-ray harmonics*	P
SESSION 8		Storage rings	Amphi E
17:30	S Schippers	*Photorecombination of atomic ions in storage rings*	R
18:15	D Strasser	*Dynamics of H_3^+ dissociative recombination: solving the enigma ?*	P
18:45	T Stoehlker	*X-Ray spectroscopy on cooled heavy ions at storage rings*	P
SESSION 9		PAMO 2004	Amphi Simon
17:30	D Comparat	*Ultra-cold plasma, Rydberg atoms and stellar dynamics*	P
18:00	A Alexandrou	*Internal protein dynamics studied by mid-infrared femtosecond spectroscopy*	P
18:30	A Amy-Klein	*Absolute frequency measurement of molecular transitions with a femtosecond laser...*	P

Thursday, July 8, 2004

SESSION 1		Plenary Lecture	Amphi Simon and E	
09:00	M Drescher	*Atomic dynamics with attosecond light pulses*		
SESSION 2		AMPD General Assembly	Amphi Simon and E	
10:00				
SESSION 3		Fundamental concepts and precision measurements	Amphi E	
11:15	N Kolachevsky	*High precision frequency measurements and search for drift of fundamental constants*		S
11:30	G Saathof	*Precision test of relativistic time dilation*		S
11:45	G Werth	*The bound electrons g-factor in hydrogenic O^{7+}*		S
12:00	P Cladé	*A preliminary measurement of h/m_{Rb} using ultracold atoms*		S
SESSION 4		Atomic, molecular and electronic collisions	Amphi Simon	
11:15	S Gomez-Carrasco	*Direct versus resonance mediated $F(^2P)$ + $OH(^2\Pi)$ collision dynamics on a new....*		S
11:30	D Field	*Cold electron scattering by a chiral molecule*		S
11:45	J Gorfinkiel	*Ab initio cross sections for electron-molecule collisions at intermediate energies*		S
12:00	M Schoffler	*Dissociative charge transfer to HeH^+ and H_2*		S
12:15	R Lazauskas	*Description of ^{4}He tetramer bound and scattering states by ab initio four-body....*		S

Friday, July 9, 2004

SESSION 1		Plenary Lecture	Amphi Simon and E
09:00	HP Winter	*Impact of slow ions on solid surfaces: electron emission, sputtering and novel applications*	
SESSION 2		Atomic and molecular structure and spectroscopy	Amphi Simon
10:30	A Viel	*Hydrogen tunnellng in malonaldehyde: full dimensional quantum mechanical studies*	S
10:45	V Bezchastnov	*Magnetically induced anions*	S
11:00	I Liontos	*Two photon ionization of calcium above the $4S_{1/2}$ threshold*	S
11:15	R Hentges	*Interference effects in the photoionization of ultrafast dissociating molecules*	S
11:30	D Bodewits	*Probing space weather via radiative charge transfer in comets*	S
SESSION 3		Surfaces	Amphi E
10:30	D Lemoine	*Theoretical dynamics of recombinative collisions of gas phase atoms with atoms....*	P
11:00	D Farias	*Using diffraction to study the hydrogen dissociation dynamics at surfaces: experiment....*	P
11:30	Z Herman	*Energy transfer and chemical reactions in collisions of slow polyatomic ions with surfaces*	P
SESSION 4		Symposium on atoms, molecules, optics in Astrophysics	Amphi A
10:30	D Field	*Star formation matters*	P
11:10	I Sims	*Gas-phase kinetics and dynamics at very low temperatures: obtaining data for...*	P
11:40	L Nahon	*Giant circular dichroism in the photoionization of chiral molecules probed by electron...*	P
SESSION 5		Cold atoms and quantum computing	Amphi Simon
15:30	F Remacle	*Transport properties and gating effects in arrays of metallic quantum dots*	R
16:15	T Monteiro	*Cold atoms in optical lattices: theory and experiments with chaotic ratchets and filters*	P
16:45	G Ferrari	*Progress towards an optical frequency standard referenced to Strontium intercombination*	S
SESSION 6		Fundamental symmetries and antimatter	Amphi E
15:15	M Kozlov	*Atomic and molecular calculations for studies of fundamental symmetries*	R
16:00	N Madsen	*Dynamics of antihydrogen formation*	P
16:30	A Saenz	*Molecular physics with antihydrogen*	P
SESSION 7		Symposium on atoms, molecules, optics in astrophysics	Amphi A
15:30	L Hornekaer	*The importance of morphology in molecular hydrogen formation on interstellar grain ....*	P
16:00	U Meierhenrich	*Astrophysical origins of biomolecular asymmetry*	P
16:30	A Dawes	*Frosty astrophysical molecular factories: from space to the laboratory*	P
SESSION 8		Collisions	Amphi Simon
17:30	D Bassi	*Bond-forming ion molecule reactions*	R
18:15	H Schmidt	*New phenomena in fast collisions between protons and He and H_2*	P
18:45	A Belyaev	*Nonadiabatic transitions and electron translation in low-energy collisions*	P
SESSION 9		Photons	Amphi E
17:30	S Themelis	*Correlation in few-photon double ionization under short XUV laser pulses*	P
18:00	V Ivanov	*Spectroscopy and photodetachment of negatively charged ions*	P
SESSION 10		Symposium on atoms, molecules, optics in astrophysics	Amphi A
17:30	N Biver	*Physics and chemistry of comets*	P
18:00	A Jolly	*UV and IR spectroscopy of organic molecules applied to Titan's atmosphere*	P
18:30		*Conclusion*	

Saturday, July 10, 2004

SESSION 1		Photon Interactions with atoms and molecules	Amphi Simon
09:00	AR Orr-Ewing	*Photofragment imaging: unravelling non-adiabatic dynamics in photodissociation*	R
09:45	M Meyer	*Present status of two-color pump-probe experiments on atoms and molecules*	P
10:15	M Piancastelli	*Recent progress in photodissociation of molecules following resonant core-excitation*	P
SESSION 2		Molecular physics	Amphi E
09:00	JP Posthumus	*Ultrafast dynamics of small molecules in intense short-pulsed laser fields*	R
09:45	B Von Issendorf	*Cooling of the hot electron gas in free sodium clusters*	P
10:15	A Lyalin	*Atomic cluster fission: from the deformed jellium model to molecular dynamics simulations*	P
SESSION 3		Cold atoms, molecules and ions	Amphi Simon
11:15	M Drewsen	*Cold molecular ions in Coulomb crystals*	R
12:00	G Modugno	*Interactions in potassium-rubidium Fermi-Bose mixtures*	P
12:30	E Bodo	*Ultracold collision dynamics involving molecular systems*	P
SESSION 4		Clusters	Amphi E
11:15	C Bréchignac	*Decay of cluster ions*	R
12:00	C Bordas	*Time-resolved photoelectron spectroscopy of small carbon clusters and fullerenes*	P
12:30	M Alcami	*Structure and fragmentation of positively charged fullerenes*	P
SESSION 5		Symposium on atoms, molecules, optics and the environment	Amphi A
11:15	A Hansel	*Biogenic volatile organic compound emissions*	P
11:45	T Leisner	*Ions and charged particles in the atmosphere*	P
12:15	C Mayhew	*Investigations of low energy electron attachment to molecules using electron swarm....*	P
SESSION 6		Journal of Physics B plenary lecture (sponsored by IOP)	Amphi Simon and E
14:00	I Bloch	*Exploring quantum matter in optical lattice potentials*	
SESSION 7		Electrons	Amphi Simon
15:30	G Garcia	*Application of electron spectroscopy techniques to the study of radiation damage and ....*	P
16:00	S Matejcik	*Temperature dependence of the ionization energies of molecules*	P
16:30	M Cizek	*Electron spectra for associative detachment of negative ions*	P
SESSION 8		Lasers / photons	Amphi E
15:30	O Hoffmann	*Observation and control of atomic and molecular collisions by laser excitation*	P
16:00	K Eikema	*Extending frequency-comb metrology to the vacuum ultraviolet*	P

POSTER SESSIONS SCHEDULE

There are two 2-days poster sessions. Session A is on Tuesday 6 and Wednesday 7 while session B is on Thursday 8 and Friday 9.

For each session, 8 rooms are available. Rooms 1-4 are in Building 13 while rooms 5-8 are in Building 15.

The following table indicates the poster place for each poster number.

For example, poster place A-2-14 corresponds to panel 14 in room 2 (building 13) during session A. Poster place B-7-6 corresponds to panel 6 in room 7 (building 15) during session B.

Authors	Title	Poster number	Poster place
1. Fundamental Concepts and Antimatter			
P Cladé *et al*	A preliminary measurement of h/m_{Rb} using ultracold atoms	1-1	B-5-1
L J M Dunlop *et al*	Many-body theory of positron annihilation gamma-ray spectra	1-2	B-5-2
J Guéna *et al*	Symmetry discrimination and measurements of parity ...	1-3	B-5-3
M Jungen	Quantum chemical calculations for muonic helium	1-4	B-5-4
N Kolachevsky *et al*	2S hyperfine structure in hydrogen and deuterium atoms	1-5	B-5-5
N Kolachevsky *et al*	Hi-precision frequency measurements and search for drift ...	1-6	B-5-6
L Labzowsky *et al*	Quantum beats in hydrogen and anti-hydrogen atoms in an ...	1-7	B-5-7
E-O Le Bigot *et al*	High-precision calculation of the self energy of non-S states ...	1-8	B-5-8
M G Makris	Absorbing boundaries in time-dependent problems with ...	1-9	B-5-9
S V Malinovskaya *et al*	Consistent quantum mechanical calculation of the beta ...	1-10	B-5-10
W Quint	FLAIR - A facility for low-energy antiproton and heavy-ion ...	1-11	B-5-11
M V Ryabinina *et al*	Stimulated recombination of antiprotons and positrons with ...	1-12	B-5-12
G Saathoff *et al*	Precision test of relativistic time dilation	1-13	B-5-13
V V Smirnov	Semiclassical approximation for matrix-valued hamiltonians	1-14	B-5-14
M Trassinelli *et al*	Study of the strong interaction effect in pionic hydrogen ...	1-15	B-5-15
J Verdú *et al*	The bound electrons g-factor in hydrogenic O^{7+}	1-16	B-5-16
2. Atomic and Molecular Structure and Spectroscopy			
M A Abdel-Raouf	Existence of Ps*atom molecules	2-1	A-2-1
F G Acar *et al*	A set of programmes for the parametric analysis of ...	2-2	A-2-2
C Affolderbach *et al*	Buffer-gas and AC Stark shift induced effects in laser / ...	2-3	A-2-3
A V Akimov *et al*	Raman spectroscopy with femtosecond frequency comb	2-4	A-2-4
G Alberti *et al*	The C and O-1s edge of propylene oxide studied by ...	2-5	A-2-5
O Allard *et al*	Long-range interaction in calcium dimer	2-6	A-2-6
O Arnoult *et al*	Ultrahigh resolution spectroscopy of the 1S-3S line in ...	2-7	A-2-7
S A Astashkevich	Semi-empirical study of the isotopic effect in Lande g- ...	2-8	A-2-8
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Addendum

REACTION INTERMEDIATES IN HIGH TEMPERATURE CATALYTIC WATER FORMATION STUDIED WITH CAVITY RINGDOWN SPECTROSCOPY

S. Hemdal, Å. Johansson, M. Försth, M. Andersson, A. Rosén*
Experimental Physics, Chalmers University of Technology and Göteborg University, Sweden
*arne.rosen@fy.chalmers.se

The $2H_2+O_2 \rightarrow 2H_2O$ reaction is a well-studied system for catalytic combustion, because the chemistry of H_2 and O_2 is relatively simple compared to combustion of hydrocarbons. The OH molecule is an important intermediate and at high temperatures of the catalyst OH can desorb into the gas-phase. Desorbed OH molecules outside noble metal catalysts have previously been extensively studied with Laser-Induced Fluorescence (LIF), which gives the relative distribution of the target molecule. However, absolute number densities are difficult to obtain mainly due to quenching. Measurements of relative concentrations provide useful insight into combustion processes and are for example sufficient for determining important parameters such as the temperature. Absolute number densities are desirable for quantitative comparisons with simulations and will also give valuable information when determining rate constants and are preferred for the detailed understanding of the complex combustion chemistry. In this work we have used cavity ringdown spectroscopy (CRDS) to measure the rotational temperature and evaluate the absolute concentration of OH in the gas-phase desorbing from a Pt catalyst during the $2H_2+O_2 \rightarrow 2H_2O$ reaction. A mixture of H_2 and O_2 gases was used forming a stagnation point flow field outside the catalyst. The temperature of the catalyst was 1500 K, the total pressure in the chamber was 26 Pa and the relative hydrogen concentration, α_{H2}, was varied between 0% and 100%. The laser beam passed 6.5 mm outside the catalyst. From a Boltzmann plot, the rotational temperature was determined to be 775±24 K. The amount of OH was determined to be $1.5\pm0.2\cdot10^{12}$ cm^{-3} at the maximum in OH production (α_{H2}=10%). A similar experiment has also been performed using a polycrystalline palladium catalyst. However, due to a lower amount of OH in the gas phase, the number density of OH could not successfully be determined outside Pd. In this study we have shown that cavity ringdown spectroscopy successfully can be used to quantify desorbed intermediates within a catalytic reaction.

VISUALIZATION OF THE FUEL DISTRIBUTION IN A SPRAY USING LASER INDUCED EXCIPLEX FLUORESCENCE, COMPARISON TO MIE SCATTERING AND LASER INDUCED FLUORESCENCE

F. Persson, S. Hemdal, M. Andersson, A. Rosén*
Experimental Physics, Chalmers University of Technology and Göteborg University, Sweden
*arne.rosen@fy.chalmers.se

In order to reduce fuel consumption and CO_2 emission from engines the combustion process must be more efficient. By using Gasoline Direct Injection (GDI) the combustion events can be more controlled, with a fuel richer homogeneous charge at higher load and the fuel leaner stratified charge at low load. An important issue is to achieve an optimal mixture for ignition at the spark plug, i.e. no droplets during the injection time, but enough fuel vapor to obtain an ignitable mixture. In order to characterize the performance of different injection systems, it is therefore of great interest to use methods capable of separate imaging of the fuel in vapor and liquid phase. Mie scattering is generally considered a good method for visualization of liquid droplets. Laser-induced fluorescence (LIF) can be used to probe the fuel in gas phase if a fluorescent tracer molecule is added to the fuel. A limitation, however, is that also tracer molecules in the liquid will fluoresce and in areas with a high abundance of liquid fuel the amount of vapor is difficult to evaluate. A higher contrast between liquid and vapor can be accomplished by using laser-induced exciplex fluorescence (LIEF). In this method the fuel is doped with two different tracers, which in liquid phase form an excited complex (exciplex) upon excitation with the laser light. The fluorescence of the exciplex is red-shifted compared to that of the individual molecules and, thus, the spectral signature of the fluorescence of the liquid and vapor phases will be different.

In this study the fuel distribution, from an air-assisted injector in a high-pressure/high-temperature combustion chamber, has been visualized with LIEF, using two different exciplex mixtures. The fluorescence emission wavelengths and the optimal concentration relations between the exciplex dopants were found by characterizing liquid samples in a fluorescence spectrophotometer at room temperature and ambient pressure. The dopants used and the best found concentration relations were for one of exciplex combinations, 1 % fluorobenzene (fbz) together with 9% triethylamine (tea) and for the other exciplex combination, 1% 4-fluorotoluene (ftu) together with 9% triethylamine (tea). The test conditions in the high-pressure high temperature cell were 2.5 bar and 111° C. The injection pressure of the spray was 6.5 bar and as fuel iso-octane was used. The fourth harmonic output of a Nd:YAG-laser (λ=266 nm) was transformed into a 48 mm high laser sheet cutting through the center of the spray. The fluorescence from the liquid and the vapor was simultaneous captured on two separate ICCD cameras, with band-pass and long-pass filters selected to fit the exciplex and monomer emission spectra with minimum overlap. To enable calibration of the laser intensity for each image, a small portion of the laser light was deflected onto a dye cell, placed so that the fluoresced light from the cell was captured by one of the cameras. The development of the spray was followed by taking images from start of injection to end of injection in steps of 0.1 ms for exciplex fbz+tea mixture, and in step of 0.2 ms for exciplex mixture ftu+tea mixture. In order to compare and confirm the results measurements under the same conditions were made using Mie-scattering and simultaneous laser-induced fluorescence with 3-pentanone as a marker. Simultaneous measurements of Mie-scattering and exciplex (fbz+tea) were also performed.

Both the LIEF and the Mie/LIF methods give comparable results for the evaluation of the spray penetration length, and both methods are capable of identifying that the fuel vapor extends outside the volume where liquid droplets are present. The fbz+tea exciplex seems to follow the Mie-scattering more closely than the ftu+tea exciplex. The LIEF method appears more sensitive in selective detection of the fuel in vapor and liquid phases since there is a larger difference between the exciplex and the monomer fluorescence than between the Mie-scattering and the LIF signal. This is expected since much of the pentanone fluorescence comes from the liquid. LIEF is a powerful tool for visualization of the fuel distribution in a spray if dopants and experimental parameters are chosen carefully.

Adsorption of small molecules and catalytic reactions on free neutral metal clusters

Arne Rosén and Mats Andersson
Department of Experimental Physics, Chalmers University of Technology and
Göteborg University, SE-41296 Göteborg, Sweden

Clusters with novel physical and chemical properties will have applications in modern nanotechnology when the clusters are deposited on some substrate or connected to microscopic units. Realization of this requires theoretical and experimental data of the properties of free clusters, the substrate and the interaction between them.

We present in this contribution some studies of free metal clusters (~8-50 atoms) investigated at single-collision-like conditions in a molecular beam experiment[1]. A beam of clusters is generated with a pulsed laser vaporisation source and after expansion into vacuum the cluster beam passes collision cells, in which the clusters can make one or a few collisions with reactive gas molecules. A strong size dependence in the reaction probability, S, of N_2 with tungsten clusters[2] is observed. When the temperature of the cluster source is lowered from room temperature to 80 K the reactivity increases strongly and N_2 adsorbes in a weakly bound molecular state, whereas only a strongly bound dissociative state is stable at room temperature. Platinum clusters (7-30 atoms) [3] after reacting with O_2, pass a second cell containing H_2 (D_2) the number of adsorbed oxygen atoms decreases with increasing H_2 pressure. The only reasonable explanation for this behaviour is the formation of water molecules in a catalytic reaction.

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Molecular dynamics study of single-walled carbon nanotube nucleation

Feng Ding*, Arne Rosén and Kim Bolton

Experimental Physics, School of Physics and Engineering Physics,

Göteborg University and Chalmers University of Technology

SE-412 96, Göteborg, Sweden

Tel: 0046-31-7723295 Fax: 0046-31-7723496

E-mail: arne.rosen@fy.chalmers.se

http://fy.chalmers.se

Molecular dynamics simulations were used to study single-walled carbon nanotube (SWNT) nucleation from iron carbide (FeC) clusters. Consistent with experimental observations, the simulations show that graphite sheets are formed around the FeC particle at temperatures below 500 K, SWNTs are nucleated between 800 and 1400 K, and a three-dimensional soot-like structure is formed above 1600 K. For all three growth processes the FeC cluster is highly supersaturated in C before graphitic islands are nucleated on the cluster surface. At low temperatures these islands do not lift off the FeC cluster and large graphite sheets that completely cover and poison the cluster are formed. At intermediate temperatures the islands form caps that grow into SWNTs that have similar diameters to that of the FeC cluster. At high temperatures a three dimensional soot-like structure is formed.

Multispectral Fluorescence Imaging of Basal Cell Carcinoma assisted by Computerised Image Warping

Marica B. Ericson[*1], Charlotta Berndtsson[1], Bo Stenqvist[2], Ann-Marie Wennberg[2], Olle Larkö[2] and Arne Rosén[1]

[1] Department of Experimental Physics, School of Physics and Engineering Physics, Chalmers University of Technology - Göteborg University
SE-412 96 Göteborg, Sweden

[2] Department of Dermatology, Sahlgrenska University Hospital, Göteborg University, SE-413 45 Göteborg, Sweden

[*] Marica B. Ericson
Department of Experimental Physics, School of Physics and Engineering Physics, Chalmers University of Technology - Göteborg University
SE-412 96 Göteborg, Sweden
phone: +46-31-772 32 96
fax: +46-31-772 34 96
e-mail: mica@fy.chalmers.se

Abstract

The demand for fast and effective tools for diagnosis of skin cancer has increased due to the increasing incidence of skin cancer. Photodynamic diagnosis (PDD) has shown a potential for demarcation of basal cell carcinoma (BCC), which is the most common type of skin cancer. The PDD technique is based on fluorescence imaging of protoporphyrin IX, which is accumulated in the skin after application of δ-5-aminolevulinic acid (ALA).

The main problem with he PDD technique is that it is sensitive for undesired local intensity variations originating from, for example, surface curvatures. It has been shown that by combining autofluorescence (i.e. fluorescence without any photosensitiser) and Pp IX fluorescence, the effect from these problems can be minimised, resulting in higher contrast between tumour and normal skin. This has been reported earlier using techniques based on expensive equipment allowing for simultaneous recording of autofluorescence and Pp IX fluorescence. In this work we present a method, using a non-expensive multispectral imaging set up assisted by computerised image alignment for this purpose. The images are aligned using the procrustes algorithm for image warping.

The set up was evaluated investigating 9 patients with histologically verified BCC located in the face, which is an area with high degree of surface curvature. Decreased autofluorescence in the tumour area was found in 7 of the patients. The original Pp IX fluorescence showed good agreement with tumour area in only 2 cases, and partial or larger in 6 cases; however, after combination of autofluorescence and Pp IX fluorescence, 4 cases showed good agreement and 4 partly agreement. These results imply that multispectral fluorescence imaging is a potential diagnostic tool for demarcation of BCC.

Post-Deadline Abstracts

FINE AND HYPERFINE STRUCTURE IN THE TRIPLET AND QUINTET STATES OF THE O_2, O_3 AND O_4 EXCITED SPECIES

Boris Minaev

Cherkassy State University of Technology

The zero-field splitting (ZFS) have been calculated by time-dependent multi-configuration self-consistent field (MCSCF) method with account of response function and estimations of spin-spin coupling and spin-orbit coupling (SOC) [1] for O_2 in the ground and excited $A^3\Sigma_u^+$ $B^3\Sigma_u^-$, $^5\Sigma_u^-$, $^5\Pi_g$ states, for O_3 in the $^3A_2$, $^3B_2$ and $^3B_1$ states. For the O_4 van-der-Waals dimer a great number of states have been calculated, which correspond to different combinations of the singlet and triplet states of O_2 molecules. Particular attention has been paid to combinations of the $X^3\Sigma_g^-$, $a^1\Delta_g$ and $b^1\Sigma_g^+$ states of two oxygen moieties. Only spin-spin coupling have been accounted explicitely in the O_4 dimers. Second-order SOC contribution has been added as it was estimated for the $X^3\Sigma_g^-$ state. The ZFS in the triplet states of ozone molecule strongly depends on geometry. Even small variations of the bond angle provide huge changes in the second-order SOC contribution to the ZFS patterns. The expectation value of spin-spin coupling also change dramatically. Spin-rotation coupling constants and electronic g-factors have also been calculated for all states and compared with experimental data where they are available.

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FINE STRUCTURE AND INTENSITY OF THE $a^3\Sigma_u^+$ - $X^1\Sigma_g^+$ TRANSITION IN Li_2 MOLECULE

B.F. Minaev

Cherkassy State University of Technology, Cherkassy, 18006, Ukraine

Observation of Bose-Einstein condensation in $^7Li_2$ [1] initiates the interest in the scattering length of two ground state lithium atoms when they approach each other as a radical pair triplet $a^3\Sigma_u^+$ state. Many properties of this state are still unknown. In present work a number of low-lying triplet states of lithium molecule are calculated by MCSCF and response techniques with account of spin-orbit coupling, spin-spin coupling and some other magnetic perturbations. The singlet-triplet transition probabilities to the ground state are also presented. Most results are connected with the $a^3\Sigma_u^+$ state, radiative lifetime and spin splitting of which were unknown so far. This state is weakly bound and has a very small spin splitting, λ_{ss} = -0.01 cm^{-1}, which is negligible in comparison with the line width in Fourier-transform spectra. Similar splitting is obtained for the upper state of the $1^3\Sigma_g^+$ - $a^3\Sigma_u^+$ transition. This is in agreement with experimental rovibronic analysis of the $1^3\Sigma_g^+$ - $a^3\Sigma_u^+$ band system in which the triplet structure was not resolved. The radiative lifetime of the $a^3\Sigma_u^+$ state is predicted to exeed 10 hours.

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VAN DER WAALS BOUND STATES FOR THE H_2O-H_2 SYSTEM USING A KRYLOV SUBSPACE METHOD

M. Wernli, P. Valiron, L. Wiesenfeld(*)

Laboratoire d'Astrophysique, Observatoire de Grenoble, B.P. 53, 38041 Grenoble cedex 09, France
(*) Also at : Laboratoire de Spectrométrie Physique, BP 87, 38402 Saint Martin d'Hères, France

We estimate the van der Waals bound states of the $H_2O - H_2$ system, in a simplified rotating H_2 - non-rotating H_2O model. The surface employed for this study is presented in [1]. An algorithm using Krylov subspaces has been developed to solve a one-dimensional symmetric eigenvalue problem. This algorithm is able to give all the eigenstates and eigenvalues for the van der Waals problem, with a very high precision for low lying states.

Both proton acceptor (A) and proton donor (B) configurations are studied with H_2 being in para and in ortho forms. For the para case, there is only one bound state, completely delocalized. For the ortho case, we find two bound states, one for the proton acceptor configuration and one for the proton donor configuration. Binding energies are around 58 cm^{-1} and 60 cm^{-1} respectively. In both geometries, we also find an excited bound state with binding energies of $3-5$ cm^{-1}. Results are generally in good agreement with the few available experimental data [2]. This agreement constitutes a validation of our new potential energy surface. Furthermore, our results could motivate a forthcoming experiment giving directly the van der Waals spectroscopy of the system.

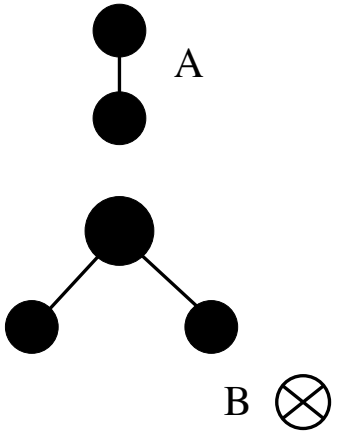

Figure 1: Proton acceptor (A) and proton donor (B) configurations

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PHOTOABSORPTION SPECTRA OF A LASER PRODUCED TELLURIUM PLASMA

Lynn Gaynor, Anthony Cummings, Nicola Murphy and Gerry O'Sullivan

Atomic and Molecular Physics Research Group, Experimental Physics Department, University College Dublin, Belfield, Dublin 4, Ireland

Deirdre Kilbane and Paul van Kampen

Centre for Laser Plasma Research, Dublin City University, Glasnevin, Dublin 9, Ireland

The dual laser plasma technique involves generation of both an absorbing species and a synchronised bright backlighting source using a pair of laser produced plasmas [1]. The maximum ion stage attained in the absorbing plasma is, to a certain extent, controllable and is primarily limited by the laser irradiation conditions, specifically power density on the target. Variation of the time delay between the formation of the two plasmas and the position of the absorbing plasma permits ion stage discrimination. The dual laser plasma technique is a versatile, unique and effective diagnostic tool for photoabsorption spectroscopy of low, intermediate and high ion stages [2].
The photoabsorption spectra of Te I – Te IV at different time delays have been recorded and analysed in the extreme ultraviolet and soft x-ray (XUV) region of the spectrum using a 2 m grazing incidence spectrometer. The spectra were created using two laser produced plasmas generated by two 1 J, 15 ns Nd:YAG lasers with a controllable interpulse separation. These plasmas acted as sources of both ions and XUV photons. A plasma formed from tungsten, when irradiated by a focused high power Q-switched laser, emits a quasi-continuum in the XUV region of the spectrum. The absorption of this radiation by a second laser produced plasma formed on a tellurium target was recorded.
The collisional-radiative model of Colombant and Tonon predicts that the average charge state is dependant on the plasma electron temperature, which is tunable by varying the laser power density [3]. Theoretical absorption spectra were obtained with the aid of the multi-configuration Hartee-Fock code of Cowan [4] and the relativistic TDLDA (time dependant local density approximation) code of Libermani and Zangwill [5]. The spectra of Te I – Te III were found to be dominated by a 4d-ϵf shape resonance, which peaks near 90 eV in each case. A transfer of oscillator strength from the resonance to discrete 4d-nf transitions with increasing ionisation is clearly evident, and the $4d^{10}5s^2\ {}^1S_0 - 4d^9 5s^2 4f^1\ {}^1P_1$ transition is the strongest feature in the Te IV spectrum.

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HIGH RESOLUTION MEASUREMENTS OF THE $Ne^+ 2p^4(^1D_2)\,np \rightarrow 2p^4\,^3P_{0,1,2}$ AUGER SERIES

[1]A De Fanis, [2]G Prümper, [3]M Kitajima, [4]M Oura, [3] T Tanaka, [3] H Tanaka, [5] N Kabachnik, [6] S Fritszche, and [2] K Ueda

[1] JASRI Spring-8, Sayo-gun, Hyogo 679-5198 Japan
[2] IMRAM Tohoku University, Sendai, 980-8577, Japan
[3] Department of Physics, Sophia University, Tokyo 102-8554, Japan
[4] RIKEN Spring-8, Sayo-gun, Hyogo 679-5198 Japan
[5] Institute of Nuclear Physics, Moscow State University, Moscow 119992, Russia
[6] Fachbereich Physik, Universität Kassel, 34132 Kassel, Germany

We report high resolution measurements of the valence multiplet-changing Auger transitions Ne $2p^4(^1D_2)np\ ^2F,\ ^2D \rightarrow 2p^4\ ^3P_{0,1,2}$, in the kinetic energy region 0.2-3.2 eV. Some of these Auger transitions were observed previously as a decay of valence satellite states populated via direct ionization [1]. In the present study, we populate these states via the recapture of the Ne 1s photoelectron due to post-collision interaction (PCI). In this way we could populate high n-members very efficiently.

The measurements were carried out at beamline 27 at SPring-8 in Japan with a high resolution electron spectroscopy apparatus consisting of a hemispherical electron energy analyzer (SES-2002) with a gas cell. The incident photon energy was set to 100 meV above the 1s ionization threshold. At such low excess energy the PCI between the slow photoelectron and a fast Auger electron makes the photoelectron recaptured; this recapture populates the intermediate states $2p^4(^1D_2)$, which decays further resulting in the observed transitions. The electron energy resolution is determined exclusively by the analyzer and is about 10 meV. This narrow bandwidth allows to resolve the multiplet structure in the intermediate state up to n=9; Rydberg components up to n=20 are clearly identified for the first time. MCDF ab-initio calculation have also been performed: the calculated anisotropy parameters and intensity ratios have been used to assign the observed Auger lines. Term values of the Ne $2p^4(^1D_2)np\ ^2F$ and ^2D Rydberg members have been determined: the quantum defects are found to be constant. A portion of the spectra is in Fig.1.

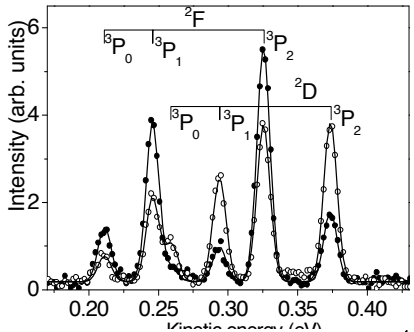

Fig. 1 : A portion of the angle resolved electron spectra containing the $2p^4(^1D_2)\ 5p\ ^2F$ and $^2D \rightarrow 2p^4\ ^3P_{0,1,2}$ bands : •=0°, ○=90°.

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CORRELATED ELECTRON DETACHMENT IN H^- – HE COLLISIONS

S.Yu.Ovchinnikov*†, G.N.Ogurtsov*, V.M.Mikoushkin*,J.H.Macek†

(*) A.F.Ioffe Physico-Technical Institute, 194021 St.-Petersburg, Russia
(†) Department of Physics and Astronomy, University of Tennessee, Knoxville, TN 37996-1200, USA

The study of interactions between H^- ions and various atoms and molecules attracts considerable interest for both theoretical and practical reasons. Theoretically, H^- is important as a simple two-electron system, which can be treated quantum mechanically. Practically, the detailed understanding of collision behavior of H^- ions is important for solving the problem of neutral beam heating in fusion research.

The electron detachment in H^- ion collisions with atoms and molecules has been studied in a lot of theoretical and experimental works (e.g. see [1] and references therein), most of them being devoted to calculation and measurement of the total detachment cross sections. In these studies, an adequate description of the experimental data have been obtained by using an approximation that the two electrons (inner and outer) of the H^- ion do not influence each other in the collision process.

More detailed information about dynamics of the detachment process can be obtained from the complex, experimental and theoretical, study of energy spectra ejected electrons. Such a study, based on comparison of theoretical and experimental data on the absolute values of doubly differential cross sections for electron ejection, has been performed by the authors [2]. The doubly differential cross sections for electron ejection in H^- – He collisions have been measured in the ion energy range 2 – 10 keV using a conventional electron spectroscopy [3]. The theoretical calculation of the cross sections has been performed using the Sturmian expansion of the total wave function in the field of two zero-range potentials [4].

It has been found that the experimental energy spectra have long exponential high-energy "tails", which can not be explained by the independent electron approximation, even if the individual contribution of the inner electron of H^- is taken into account. Our analysis shows that the high-energy parts of the electron energy spectra are produced due to correlated motion of the two electrons of H^-, in which oscillation of the inner electron in the course of S-ionization [5] not only causes ejection of the outer, loosely bound electron, but also determines its ejection energy, according to the resonance condition: $\omega_{\rm out} = \omega_{\rm in} = \omega$, where $\omega = \Delta E(R)/\hbar$, $\Delta E(R)$ being the energy transfer. The contribution of the correlated detachment mechanism to the total detachment cross section is estimated to be about 37% at 2 keV, 34% of which leads to ionization with excitation and 3% to double ionization.

This work is supported by INTAS under Grant No 2001-0155 and by the Chemical Science, Geosciences and Biosciences Division, Office of Basic Energy Science, Office of Science, U.S. Department of Energy under Grant No DE-FG02-02ER15283.

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SEARCH FOR EXOTIC CURRENTS IN THE β DECAY OF $^6He^+$ IONS USING A TRANSPARENT PAUL TRAP

X. Fléchard, G. Ban, G. Darius, P. Delahaye*, D. Durand, M. Herbane, M. Labalme, E. Liénard, F. Mauger, A. Mery, O. Naviliat, D. Rodríguez

Laboratoire de Physique corpusculaire, LPC-ENSICAEN, 6 Boulevard du Marechal Juin, Caen Cedex 14050, France
(*) CERN-ISOLDE, Geneva, Switzerland

Despite the remarkable success of the Standard Model, for many theoretical reasons, and especially because of the large number of undetermined parameters, the existence of new physics is expected [1]. Nuclear β decay continues to be of capital importance in the search of physics beyond the Standard Model since it is an unique and relatively easy-to-access laboratory for investigations of weak interactions. In the framework of the Standard Model, nuclear β decay is described in terms of current-current couplings either vector or axial-vector. Other current-current couplings such as scalar, pseudo-scalar or tensor are permitted by Lorentz invariance but forbidden by the V-A theory of the Standard Model. The contribution of such exotic interactions can only be decided on through high precision measurements of unambiguously predicted properties like the β – ν angular correlation parameter *a*. In the case of ^{6}He decay, a deviation of *a* from the Standard Model value -1/3 would imply the existence of tensor currents, mediated by new gauge bosons called *leptoquarks*.

The most precise measurement of the β – ν angular correlation parameter was performed 40 years ago using ^{6}He nuclei *($T_{1/2}$ = 808 ms)* with a relative precision of 1% [2], and constrained possible tensor contributions to less than 13%. In this experiment, only the energies of the recoiling nuclei were measured. Our goal is to improve the precision on the *a* measurement using the low energy radioactive beam line of SPIRAL in GANIL, and a transparent Paul trap as a confinement device. With the radioactive ions stored nearly at rest in a small volume defined by the driving RF field of a transparent Paul Trap, the measurement of the β - recoil ion coincidence spectrum will be performed.

The use of a transparent Paul trap was a technological challenge that has made of this experiment a pioneering development of Paul trap techniques applied to radioactive nuclides: a Radio Frequency Quadrupole Cooler Buncher adapted to low mass ions, a novel transparent Paul trap, and new imaging techniques for the trapped ions have been designed for the experiment.

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A HYBRID OPTICAL AND MAGNETIC TRAP FOR COLD CESIUM ATOMS.

Samuel Guibal, Nathalie Hoang, Nassim Zahzam, Pierre Pillet

Laboratoire Aimé Cotton
CNRS
Bât 505, Campus d'Orsay, 91405 Orsay, France

A new scheme for trapping Cs atoms in a non dissipative potential has been developped. The trap involves both optical dipole forces and magnetic forces. It is suitable for Cs atoms in the lowest energy Zeeman sublevel thus avoiding the two-body inelastic collision which prevented from reaching Bose-Einstein condensation of Cs in purely magnetic traps. Furthermore, an additional magnetic field can be applied allowing a fine tuning of the two-body elastic collision cross-section. We report on the experimental realization of such a trap and describe the characteristics of the trapped sample. An analysis of the collisional regime is performed from the measurement of the oscillatory modes of the atoms cloud.

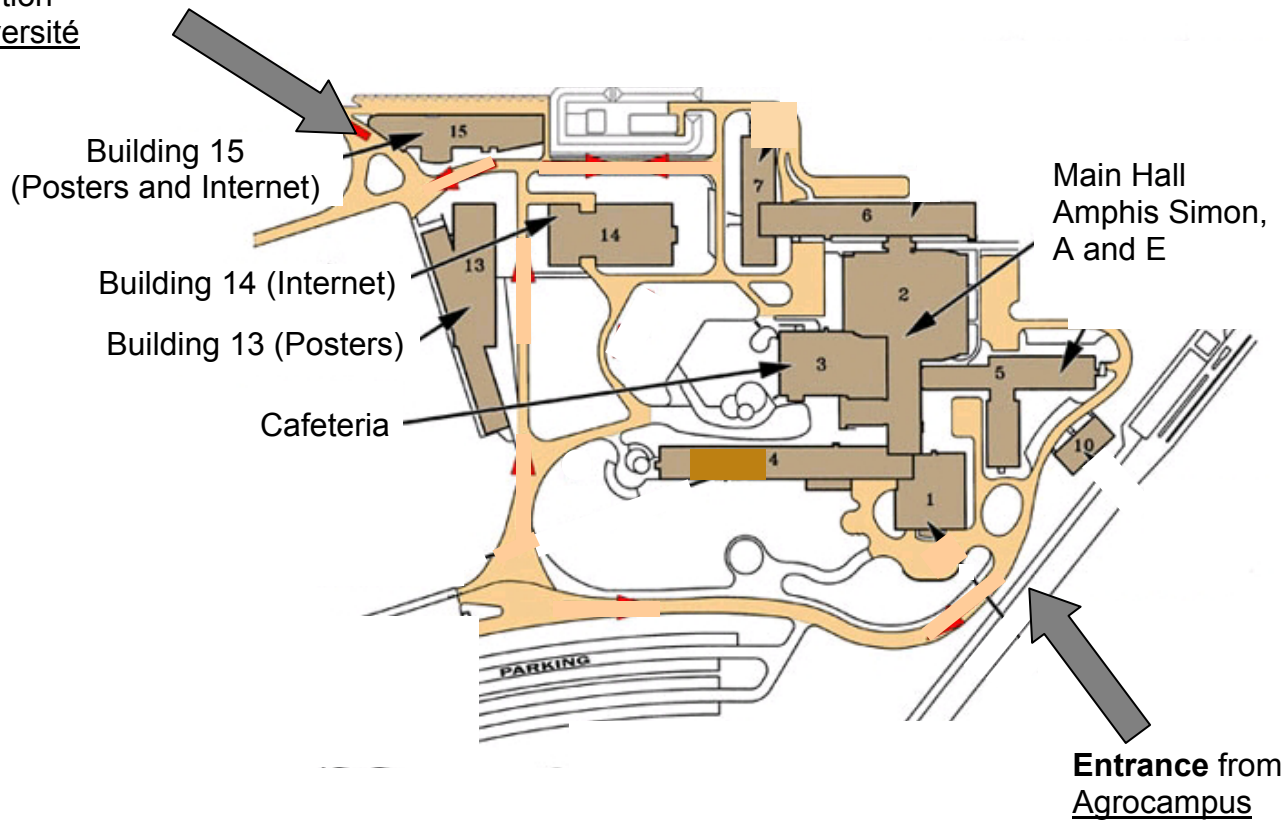
ECAMP 8 PROGRAMME SUMMARY

	Thursday 8	Friday 9	Saturday 10	
09:00	PLENARY LECTURE	PLENARY LECTURE	Photon interactions with atoms and molecules / Molecular physics	09:00
10:00	AMPD GENERAL ASSEMBLY	COFFEE BREAK		10:00
11:00	COFFEE BREAK	Atomic and molecular structure and spectroscopy / Surfaces / Symposium on atoms, molecules, optics in astrophysics	COFFEE BREAK	11:00
12:00	Fundamental concepts and precision measurements / Atomic, molecular and electronic collisions	LUNCH	Cold atoms, molecules and ions / Clusters / Symposium on atoms, molecules, optics and the environment	12:00
13:00	EGAS General Assembly / LUNCH		EGAS Board Meeting / LUNCH BOX	13:00
14:00	POSTER SESSION B	POSTER SESSION B	J. PHYS. B PLENARY LECTURE	14:00
15:00				15:00
16:00	BUSES DEPART FROM VILLEJEAN TO SAINT-MALO	Cold atoms and quantum computing / Fundamental symmetries and antimatter / Symposium on atoms, molecules, optics in astrophysics	Electrons / Lasers/photons	16:00
17:00		COFFEE BREAK	DISPERSAL	17:00
18:00		Collisions / Photons / Symposium on atoms, molecules, optics in astrophysics		18:00
19:00				19:00
20:00	CONFERENCE DINNER AT ESPACE DUGUAY-TROUIN BUSES RETURN TO RENNES (23:00)			20:00

Conference site

Université de Rennes 1
Campus Santé, Villejean

Entrance from CROUS and Metro station Villejean-Université



Entrance from Agrocampus