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# ST RI '14

9<sup>th</sup> International Conference on Nuclear Physics at Storage Rings  
September 28<sup>th</sup> – October 3<sup>rd</sup>, 2014

Sankt Goar, Germany

## Book of Abstracts

<http://stori14.gsi.de>

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# Programme

(All presentations will take place at Villa Rheinfels, room Dix/Beckmann)

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## Sunday, Sept. 28<sup>th</sup>

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19:00 2h00' Welcome reception



## Monday, Sept. 29<sup>th</sup>

09:00	05'	Opening	
09:05	15'	Welcome Address	Stöcker, Horst
09:20	40'	Storage and cooling of ion beams	Meshkov, Igor
10:00	40'	Modern Quests in Nuclear Astrophysics	Langanke, Karlheinz
10:40	30'	Coffee	
11:10	40'	In-ring experiments for nuclear astrophysics	Woods, Phil
11:50	30'	The EXL project, recent results and the future perspectives	Kiselev, Oleg
12:20	20'	Reaction studies using stored ions	Reifarh, Rene
12:40	1h30'	Lunch	
14:10	40'	Recent results from ANKE, WASA, and PAX	Khoukaz, Alfons
14:50	40'	DAFNE and KLOE	De Santis, Antonio
15:30	20'	From CELSIUS to COSY: On the Observation of a Dibaryon Resonance	Clement, Heinz
15:50	20'	BES III	Wolke, Magnus
16:10	30'	Coffee	
16:40	30'	Precision mass measurements of short-lived nuclides at storage ring in Lanzhou	Zhang, Yuhu
17:10	30'	Results and perspectives of direct mass measurements with stored relativistic exotic nuclei	Knöbel, Ronja
17:40	20'	The isochronous mass spectrometry with two Time-of-Flight detectors at the CSRe	Wang, Meng
18:00	20'	Probing isospin-symmetry breaking with storage rings	Sun, Yang

## Tuesday, Sept. 30<sup>th</sup>

08:30	30'	Storage rings at FAIR	Prasuhn, Dieter
09:00	30'	The NuSTAR Project at FAIR	Nilsson, Thomas
09:30	30'	Physics prospects with PANDA at FAIR	Brinkmann, Kai-Thomas
10:00	30'	Coffee	
10:30	40'	Electron dynamics in strong electromagnetic fields: Atomic physics with highly-charged heavy ions	Surzhykov, Andrey
11:10	30'	QED at storage rings: theory and experiments	Indelicato, Paul
11:40	20'	Dielectronic recombination experiments of oxygen-like 78Kr28+ at the HIRFL-CSRm	Ma, Xinwen / Wen, Weiqiang
12:00	20'	Observation and manipulation of coherence in the time- reversed relativistic photoelectric effect	Tashenov, Stanislav
12:20	20'	Electron spectroscopy at the high-energy endpoint of electron-nucleus bremsstrahlung studies at the ESR	Hillenbrand, Pierre-Michel
12:40	1h30'	Lunch	
14:10	40'	Penning traps for fundamental tests of nature	Blaum, Klaus
14:50	20'	The HITRAP facility for slow highly charged ions	Herfurth, Frank
15:10	20'	Precision mass measurements of exotic ions with a MR- ToF system	Wienholtz, Frank
15:30	20'	High-Performance Multiple-Reflection Time-of-Flight Mass Spectrometers for the Research With Exotic Nuclei Plaß, Wolfgang and for Analytical Mass Spectrometry	
15:50	30'	Coffee	
16:20	30'	Storage ring experiments of resonant electron-ion collisions at the interface of atomic and nuclear physics	Brandau, Carsten
16:50	30'	Lifetime Measurements of Nuclei in Few-Electron Ions	Faestermann, Thomas
17:20	20'	Study projectile fragmentation reaction with Isochronous Mass Spectrometry	Tu, Xiaolin
17:40	20'	First Nuclear Transfer Reaction Measurement at the ESR, For the Investigation of the $^{15}\text{O}(\alpha,\gamma)^{19}\text{Ne}$ reaction	Doherty, Dan
18:00	20'	Isoscalar giant resonance studies in a stored-beam experiment for the EXL project	Zamora Cardona, Juan Carlos
20:00		Poster Session	

## Wednesday, Oct. 1<sup>st</sup>

08:00	40'	Electrostatic Storage Rings	Schmidt, Henning
08:40	30'	The CSR Project at MPIK	Von Hahn, Robert
09:10	20'	First Experiments at the Frankfurt Low Energy Electrostatic Storage Ring (FLSR)	King, Frederik
09:30	30'	Coffee	
10:00	30'	Antiproton Chain of FAIR Storage Rings	Katayama, Takeshi
10:30	30'	Physics with low energy antiprotons	Widmann, Eberhard
11:00	20'	Toward polarized antiprotons: Machine development for Spin-filtering Experiments at COSY	Weidemann, Christian
11:30		Conference Excursion	

## Thursday, Oct. 2<sup>nd</sup>

08:30	30'	Electron Cooling at COSY/HESR	Kamerdzhev, Vsevolod
09:00	20'	Laser cooling of hot, relativistic ion beams at FAIR	Winters, Danyal
09:20	30'	Internal targets at storage rings	Grigoryev, Kirill
09:50	20'	Prototype internal target design for storage ring experiments	Petridis, Nikolaos
10:10	20'	Experimental techniques for in-ring reaction experiments	Mutterer, Manfred
10:30	30'	Coffee	
11:00	30'	Laser Spectroscopy at Storage Rings	Nörtershäuser, Wilfried
11:30	20'	Laser spectroscopic determination of the hyperfine splitting in Li-like bismuth – one step forward	Sanchez Alarcon, Rodolfo Marcelo
11:50	20'	FOCAL - Precision X-Ray Spectroscopy for the 1S Lamb-Shift in H-Like Gold	Gaßner, Tobias
12:10	20'	Precise determination of the 1s Lamb shift in hydrogen-like heavy ions at the ESR storage ring using microcalorimeters	Kraft-Bermuth, Saskia
12:30	20'	Metallic Magnetic Calorimeters for High-Resolution X-ray Spectroscopy	Hengstler, Daniel
12:50	1h30'	Lunch	
14:20	30'	Atomic physics at the future Facility for Antiproton and Ion Research	Gumberidze, Alexandre
14:50	20'	The ILIMA project at FAIR	Walker, Philip
15:10	20'	Non-Achromatic vs. Achromatic Isochronous Mode of the Collector Ring at FAIR	Litvinov, Sergey
15:30	30'	Present status of the Rare-RI Ring facility at RIBF	Yamaguchi, Takayuki
16:00	20'	Isochronous field study of the Rare-RI Ring	Abe, Yasushi
16:20	30'	Coffee	
16:50	30'	The SCRIT electron scattering project at RIKEN RI Beam Factory	Ohnishi, Tetsuya
17:20	20'	The ELISE experiment, potential paths towards its realisation	Simon, Haik
17:40	20'	The PANDA Central Straw Tracker	Serdyuk, Valeriy
18:00	20'	Spin coherence time studies of a polarized deuteron beam at COSY	Guidoboni, Greta
18:20	20'	Two-photon exchange contribution in elastic electron-proton scattering: measurements at VEPP-3 storage ring	Rachek, Igor
20:00		Conference Dinner	

## Friday, Oct. 3<sup>rd</sup>

08:30	30'	The TSR@ISOLDE Project at CERN	Raabe, Riccardo
09:00	20'	CRYRING@ESR: Present Status and Future Research	Lestinsky, Michael
09:20	30'	Reaction microscopes at storage rings	Fischer, Daniel
09:50	20'	The MOTReMi: A versatile tool to study ion-atom collisions	Schuricke, Michael
10:10	20'	A SQUID-based Beam Current Monitor for FAIR/CRYRING	Geithner, René
10:30	30'	Coffee	
11:00	40'	Fundamental Symmetries and Interactions	Jungmann, Klaus
11:40	30'	Electric Dipole Moment Measurements at Storage Rings	Pretz, Joerg
12:10	30'	Colliding or Counter-rotating Ion Beams in Storage Ring for EDM Search	Koop, Ivan A.
12:40	1h30'	Lunch	
14:10	30'	The FAIR Project	Sharkov, Boris
14:40	30'	The Nuclotron/NICA Project at JINR	Shurkhno, Nikolay
15:10	30'	Introduction of HIAF project	Yang, Jiancheng
15:40	30'	Coffee	
16:10	40'	Future radioactive-ion beam facilities	Gales, Sydney
16:50	40'	Concluding Remarks	
17:30		Closing of the Conference	

## Poster session – Tuesday, Sept. 30<sup>th</sup>, 20:00

Title	Presenter	Board #
Nuclear structure studies in the Rb and Cs region using high-precision Penning-trap mass data	Atanasov, Dinko	1
Proton-proton elastic scattering studies using the internal target at COSY	Bagdasarian, Zara	2
Search for heavy exotics with hidden charm in antiproton-proton annihilation	Barabanov, Mikhail	3
A 3D Molecular Fragmentation Imaging detector for the Cryogenic Storage Ring	Becker, Arno	4
Study of nuclear level density in the case of the hot Sn neutron-rich isotopes.	Benhamouda, Naziha	5
Compton polarimetry with hard X-rays using segmented solid state detectors	Blumenhagen, Karl-Heinz Spillmann, Uwe	6
A new approach to the particle position detection in a storage ring	Chen, Xiangcheng	7
Magnetic field distribution inside the aperture of a Steerer magnet prototype	Dan, Vasile-Daniel	8
Design of a New Time-Of-Flight Detector for Isochronous Mass Spectrometry in the Collector Ring at FAIR	Diwisch, Marcel	9
Time-Domain Approach for Stochastic Cooling Study	Dolinska, Maryna	10
Status of the Collector Ring project at FAIR	Dolinsky, Oleksiy	11
Bound-state beta- decay of bare $^{205}\text{Tl}^{81+}$	Gao, Bingshui	12
Experimental Program at the Heidelberger Cryogenic Storage Ring CSR	George, Sebastian	13
Ion-optical Design of the CRYRING@ESR	Gorda, Oleksii	14
Beyond First Order Electron Loss to Continuum ELC Cusp: $d\sigma/dE_E$ for 50 AMeV $\text{U}^{28+}$ in the ESR Storage Ring	Hagmann, Siegbert	15
Metallic Magnetic Calorimeters for High-Resolution X-ray Spectroscopy	Hengstler, Daniel	16
Isobar Analogue States (IAS), Double Isobar Analog States (DIAS), and Configuration States (CS) in Halo Nuclei. Halo Isomers.	Izosimov, Igor	17
Decay of Zr isotopes and related nuclear structure effects	Kaur, Gurvinder	18
Hadronic cross sections measurement with the SND detector at VEPP-2000 e+e- collider	Kharlamov, Alexey	19
Investigation of the Heavy-Ion Mode in the FAIR High Energy Storage Ring	Kovalenko, Oleksander	20
Laser spectroscopy of lithium-like ions at HESR	Kühl, Thomas	21
Precision determination of 7.8 eV isomeric states in $^{229}\text{Th}$ at heavy ion storage ring	Ma, Xinwen	22
A particle detector for bound-state beta-decay experiments (and more) at the ESR and CR	Najafi, Mohammad Ali	23
Applications of a Barrier Bucket Cavity for the Accumulation of Rare Isotope Beams in the ESR	Nolden, Fritz	24
Measurements of neutron-induced reactions in inverse kinematics	Reifarth, Rene	25
Development of a VUV-VIS-Spectrometer for Target Characterisation	Reiss, Philipp	26
HILITE - Ions in Intense Photon Fields	Ringleb, Stefan	27

Prospects for laser spectroscopy of highly charged ions with high harmonic XUV and soft X-ray sources	Rothhardt, Jan	28
Conceptual design of elliptical cavities for intensity and position sensitive beam measurements in storage rings	Sanjari, Shahab	29
Heavy Ion Storage and Acceleration in the HESR with Stochastic Cooling and Internal Target	Stockhorst, Hans	30
SPARC experiments at the high-energy storage ring	Stöhlker, Thomas	31
Polarization phenomena in atomic bremsstrahlung	Surzhykov, Andrey	32
A resonant Schottky pick-up for Rare-RI Ring at RIKEN	Suzaki, Fumi	33
Search for T-odd P-even signal in the Proton - Deuteron Scattering	Temerbayev, Azamat	34
A new data acquisition system for Schottky signals in atomic physics experiments at GSI's and FAIR's storage rings	Trageser, Christian	35
Two-Photon Transitions in He-like Heavy Ions	Trotsenko, Sergiy	36
Precision Spectroscopy of Highly Charged Ions Stored in Penning Traps	Vogel, Manuel	37
Investigation of the Nuclear Natter Distribution of $^{56}\text{Ni}$ by Elastic Proton Scattering in Inverse Kinematics	Von Schmid, Mirko	38
Total projectile-ionization cross-sections of many-electron uranium ions in collisions with various gaseous targets	Weber, Günter	40
RF-bunching of the relativistic $^{12}\text{C}^{3+}$ ion beam for laser cooling experiments at the CSRe	Wen, Weiqiang Ma, Xinwen	39
Orbital electron capture decay rates of highly charged heavy ions at the ESR	Winckler, Nicolas	41
Fast-kicker system for Rare-RI Ring	Yamaguchi, Yoshitaka	42
Direct mass measurements of neutron-deficient $^{152}\text{Sm}$ projectile fragments at the FRS-ESR facility	Yan, Xinliang	43
Simulation of the Isochronous Mode at the HIRFL-CSRe	Yuan, Youjin	44
The CSR reaction microscope	Zhang, Shaofeng	45

# Posters



# Bound-state $\beta^-$ -decay of bare $^{205}\text{Tl}^{81+}$

**B. Gao<sup>1</sup>, F. Bosch<sup>1</sup>, C. Brandau<sup>1</sup>, C. Dimopoulou<sup>1</sup>, H. Geissel<sup>1</sup>, P.M. Hillenbrand<sup>1</sup>,  
R. Knöbel<sup>1</sup>, C. Kozhuharov<sup>1</sup>, S. Litvinov<sup>1</sup>, Yu. Litvinov<sup>1</sup>, C. Nociforo<sup>1</sup>, F. Nolden<sup>1</sup>,  
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K. Takahashi<sup>1</sup>, H. Weick<sup>1</sup>, N. Winckler<sup>1</sup>, D. Winters<sup>1</sup>, X.L. Yan<sup>1</sup>,  
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M. A. Najafi<sup>4</sup>, K. Blaum<sup>5</sup>, D. Atanasov<sup>5</sup>, W.F. Henning<sup>6</sup>, B. S. Meyer<sup>7</sup>**

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Beta decay into bound electron states of the daughter atom ( $\beta_b^-$ ), accompanied by the emission of a monochromatic antineutrino, has been predicted by Daudel et al.[1]. However, a noteworthy probability of  $\beta_b^-$ -decay exists only for highly-charged ions, which makes its observation rather difficult. The experimental storage ring ESR [2] at GSI, Darmstadt, was a unique tool for discovering  $\beta_b^-$ -decay in 1992 [3], owing to its capability of storing and cooling stable as well as unstable ions for extended periods of time. A forthcoming experiment is the determination of the half-life of  $\beta_b^-$ -decay of bare  $^{205}\text{Tl}^{81+}$ , which is related to both the solar pp-neutrino flux and the s-process nucleosynthesis. On the one hand, the LOREX [4] project addresses the relative amount of  $^{205}\text{Tl}$  and  $^{205}\text{Pb}$  atoms in deep-lying thallium-rich minerals (lorandite). There  $^{205}\text{Pb}$  atoms are generated by the capture of solar pp-neutrinos, with an unprecedented small threshold of only 52 keV. The ratio of  $^{205}\text{Pb}/^{205}\text{Tl}$  renders the product  $\langle\Phi_{\nu_e}\rangle \cdot \sigma_{\nu_e}$  of the mean pp-solar neutrino flux  $\langle\Phi_{\nu_e}\rangle$  within 4.3 million years (age of the mineral), and the neutrino capture cross section  $\sigma_{\nu_e}$ . The latter can only be obtained by measuring the half-life of  $\beta_b^-$ -decay of bare  $^{205}\text{Tl}^{81+}$  because  $\nu_e$ -capture and  $\beta_b^-$ -decay share the same nuclear matrix element. On the other hand,  $^{205}\text{Pb}$  is the only purely s-process short-lived radioactivity which gives insight in nucleosynthesis just prior to Sun's birth. It has been demonstrated [5, 6] that in the stellar environment the production rate of  $^{205}\text{Pb}$  in the s-process sensitively depends on both free electron capture of  $^{205}\text{Pb}$  and  $\beta_b^-$ -decay of bare and H-like  $^{205}\text{Tl}$ . It is thus desirable to measure the half-life of the  $\beta_b^-$ -decay of  $^{205}\text{Tl}^{81+}$  which exploits a similar technique as applied in the case of bare  $^{163}\text{Dy}^{66+}$  nuclei [3].

## References

- [1] R. Daudel et al., J. Phys. Radium **8**, 238-243 (1947).
- [2] B. Franzke, Nucl. Instr. and Meth. **B24/25**, 18-25 (1987).
- [3] M. Jung et al., Phys. Rev. Lett. **69**, 2164-2167 (1992)
- [4] M. K. Pavicevic et al., Nucl. Instr. And Meth. **A271**, 277-296 (1988)
- [5] J.B. Blake and D.N. Schramm, ApJ. **197**, 615 (1975)
- [6] K. Yokoi et al., Astron. + Astroph. **145**, 339-346 (1985)