Course Overview

Winter Term 2013/2014
Time frame for the coordinated studies programme at Bonn (B) and Cologne (C). The marked areas indicate scheduling of the most attractive courses for students from the partner institution. Fridays are reserved for early integration into research groups.
BCGS Course Overview
Winter Term 2013/2014

This list of courses provides an overview of lectures and seminars offered within the Master course programmes in Bonn and Cologne.

Certain courses are assigned as “Special BCGS Courses” such as joined courses given by lecturers from both universities, courses broadcasted to the other university by video conference, courses given as teaching exchange between both universities, or (lab) courses facilitating an early access into research. Courses of special relevance for students of the partner university have been scheduled within the BCGS time frame enabling students to travel to the partner university (see adjacent figure).

Further, you will find courses classified according to the three main research areas covered by the Graduate School: Particle and Nuclear Physics - Astronomy and Astrophysics - Condensed Matter and Statistical Physics, Photonics.

You may choose your personal curriculum with respect to your scientific interests within the terms of the corresponding Master programmes in Bonn and Cologne. In case you need any support do not hesitate to ask your mentors or the administration.

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List of Abbreviations

Institutes in Bonn

PI - Physikalisches Institut
   Nussallee 12, 53115 Bonn
HISKP - Helmholtz - Institut für Strahlen- und Kernphysik
   Nussallee 14-16, 53115 Bonn
IAP - Institut für Angewandte Physik
   Wegelerstr.8, 53115 Bonn
AlfA - Argelander-Institut für Astronomie
   Auf dem Hügel 71, 53121 Bonn

MPIfR - Max-Planck-Institut für Radioastronomie
   Auf dem Hügel 69, 53121 Bonn

Institutes in Cologne

I. PI - I. Physikalisches Institut
II. PI - II. Physikalisches Institut
IKP - Institut für Kernphysik
THP - Institut für Theoretische Physik

Zülpicher Str. 77, 50937 Köln

Rooms

SR - Seminar Room
CR - Conference Room
KOSMA - KOSMA Room
Lib - Library
LH - Lecture Hall

Video Conference
Teaching Exchange
Joined Course
# Special BCGS Courses

## Lectures

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Instructor(s)</th>
<th>Schedule</th>
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<tbody>
<tr>
<td>physics614</td>
<td>Laser Physics and Nonlinear Optics</td>
<td>M. Weitz</td>
<td>Tu 10-12, Th 14-16, LH, IAP, Bonn</td>
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<tr>
<td></td>
<td>Exercises: 1 hr in groups included</td>
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</tr>
<tr>
<td></td>
<td>Video broadcast on demand, please contact <a href="mailto:vewinger@iap.uni-bonn.de">vewinger@iap.uni-bonn.de</a></td>
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</tr>
<tr>
<td>physics618</td>
<td>Physics of Particle Detectors</td>
<td>J. Dingfelder, N. Wermes</td>
<td>Tu 14-16, Th 12, LH, IAP, Bonn</td>
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<tr>
<td></td>
<td>Exercises: 1 hr in groups</td>
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<tr>
<td>physics620</td>
<td>Advanced Atomic, Molecular and Optical Physics</td>
<td>M. Köhl</td>
<td>Tu 12, Th 10-12, LH, IAP, Bonn</td>
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<tr>
<td></td>
<td>Exercises: 1 hr in groups included</td>
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<tr>
<td>physics739</td>
<td>Basics of Quantum Information</td>
<td>F. Vewinger</td>
<td>We 14-16, LH, IAP, Bonn</td>
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<td></td>
<td>Exercises: 1 hr in groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Video broadcast on demand, please contact <a href="mailto:vewinger@iap.uni-bonn.de">vewinger@iap.uni-bonn.de</a></td>
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<tr>
<td>53102</td>
<td>Solid State Theory</td>
<td>M. Garst</td>
<td>3 hrs lectures &amp; 1 hr tutorials every second week</td>
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<tr>
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<td>Th 8-9.30, SR THP, Fr 12-13.30, SR II.PI, Cologne</td>
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<tr>
<td>53105</td>
<td>Superconductivity</td>
<td>T. Lorenz</td>
<td>2 hrs We 10-11.30, SR II. PI, Cologne</td>
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<tr>
<td>53110</td>
<td>Nuclear Physics II</td>
<td>J. Jolie</td>
<td>3 hrs We 17.45-18.30, Fr 10-11.30, SR IKP, Cologne</td>
</tr>
<tr>
<td>53114</td>
<td>Stochastic Processes</td>
<td>M. Lässig</td>
<td>3 hrs (and talks upon agreement)</td>
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<tr>
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<td>We 14-15.30, LH II, Fr 10-11.30 SR THP, Cologne</td>
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<tr>
<td>53116</td>
<td>Introduction to Biophysics</td>
<td>B. Maier</td>
<td>4 hrs Mo 14-15.30 SR IKP, We 14-15.30 SR THP</td>
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<td>Exercises: 2 hrs We 16-17.30, SR THP, Cologne</td>
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### Special BCGS Courses

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Instructor(s)</th>
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<tbody>
<tr>
<td>53118</td>
<td>Physics of Surfaces and Nanostructures</td>
<td>T. Michely</td>
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<tr>
<td></td>
<td>2 hrs Mo 16-17.30, CR THP, Cologne</td>
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<tr>
<td>53130</td>
<td>Topology for Physicists II</td>
<td>M. Zirnbauer</td>
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<tr>
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<td>4 hrs Mo, We 12-13.30, SR THP, Cologne</td>
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<tr>
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<th>Instructor(s)</th>
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<tbody>
<tr>
<td>53131</td>
<td>Symmetries in Atomic Nuclei (Theoretical Nuclear Physics III)</td>
<td>J. Jolie</td>
</tr>
<tr>
<td></td>
<td>2 hrs Tu 16-17.30, SR IKP, Cologne</td>
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Due to technical support issues, lectures by video might be shifted to other rooms on short notice. Please check the BCGS website and local announcements.

If you are interested in a specific course but are unable to travel, please inquire if video broadcast is possible.

### Seminars

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<th>Title</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>53401</td>
<td>Advanced Seminar on Applications of the Nuclear Shell-Model</td>
<td>A. Blazhev</td>
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<td></td>
<td>2 hrs We 10-11.30, Lib IKP, Cologne</td>
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### Intensive Courses

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<tr>
<td></td>
<td>October 7-11, 2013</td>
<td></td>
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<tr>
<td></td>
<td>for more information see <a href="http://www.uni-bonn.de/~etoerne/teaching/intensive-week13">http://www.uni-bonn.de/~etoerne/teaching/intensive-week13</a></td>
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<th>Instructor(s)</th>
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<tbody>
<tr>
<td>53140</td>
<td>BCGS Intensive Week EXPORT (Osaka University) &quot;Symmetry in the sub-atomic systems&quot;, Osaka, Japan; February 17-21, 2014</td>
<td>J. Jolie, Y. Fujita et al.</td>
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<thead>
<tr>
<th>Course Code</th>
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<th>Instructor(s)</th>
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Research Internships

Students become a temporary member of a research group for a typical duration of four weeks, further information:
http://www.gradschool.physics.uni-koeln.de

for similar courses, see

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<th>Code</th>
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<th>Location</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>physics717</td>
<td>High Energy Physics Lab, Bonn 4 to 6 weeks on agreement</td>
<td>Bonn</td>
<td>E. von Törne</td>
</tr>
<tr>
<td>physics732</td>
<td>Optics Lab, Bonn 4 to 6 weeks on agreement</td>
<td>Bonn</td>
<td>F. Vewinger, S. Linden, D. Meschede, M. Weitz</td>
</tr>
<tr>
<td>53199</td>
<td>Miniforschung (Internship during semester break for advanced students), Cologne</td>
<td>Cologne</td>
<td>Professors and Lecturers of the Physics Institutes</td>
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General Courses

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<th>Instructor(s)</th>
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<tbody>
<tr>
<td>physics606</td>
<td>Advanced Quantum Theory Mo 12-14, We 13, LH I, PI, Bonn Exercises: 2 hrs in groups</td>
<td>Bonn</td>
<td>B. Kubis, C. Urbach</td>
</tr>
<tr>
<td>physics607</td>
<td>Advanced Theoretical Physics Mo 12-14, We 13, LH HISKP, Bonn Exercises: 2 hrs in groups</td>
<td>Bonn</td>
<td>U. Meißner, A. Rusetsky</td>
</tr>
<tr>
<td>physics751</td>
<td>Group Theory Mo 10-12, Th 13, LH I, PI, Bonn Exercises: 2 hrs in groups</td>
<td>Bonn</td>
<td>S. Förste</td>
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<tr>
<td>physics760</td>
<td>Computational Physics Tu 10-12, SR I, HISKP, Bonn Exercises: 2 hrs in groups</td>
<td>Bonn</td>
<td>C. Urbach, B. Knippschild</td>
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### General Courses

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<tr>
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<tr>
<td>physics774</td>
<td>Electronics for Physicists</td>
<td>P.-D. Eversheim</td>
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<td>Tu 10-12, Th 12, LH, HISKP, Bonn</td>
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<td>Exercises: 1 hr in groups</td>
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<tr>
<td>6951</td>
<td>Seminar on Scientific Writing</td>
<td>R. Izzard</td>
</tr>
<tr>
<td></td>
<td>We 10-12, R 0.008, AlfA, Bonn</td>
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<tr>
<td>53080</td>
<td>Advanced Statistical Physics</td>
<td>J. Berg</td>
</tr>
<tr>
<td></td>
<td>4 hrs Tu 14-15.30, Th 10-11.30, LH III,</td>
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<td>Exercises: 2 hrs Mo upon agreement</td>
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<tr>
<td>53082</td>
<td>Advanced Quantum Mechanics</td>
<td>A. Rosch</td>
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<tr>
<td></td>
<td>4 hrs Mo 10-11.30, Tu 8-9.30, LH III,</td>
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<td>Exercises: 2 hrs We upon agreement</td>
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### Particle and Nuclear Physics

<table>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>physics611</td>
<td>Particle Physics</td>
<td>H. Schmieden</td>
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<tr>
<td></td>
<td>Tu 13, Th 8-10, SR I, HISKP, Bonn</td>
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<td>Exercises: 1 hr in groups</td>
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<tr>
<td>physics612</td>
<td>Accelerator Physics</td>
<td>W. Hillert, R. Maier</td>
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<td></td>
<td>We, Th 10-12, SR I, HISKP, Bonn</td>
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<td>Exercises: 1 hr in groups included</td>
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<tr>
<td>physics615</td>
<td>Theoretical Particle Physics</td>
<td>H.-P. Nilles</td>
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<td>Mo 16, Tu 16-18, LH I, PI, Bonn</td>
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<td>Exercises: 2 hrs in groups</td>
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<tr>
<td>physics616</td>
<td>Theoretical Hadron Physics</td>
<td>C. Hanhart, S. Krewald, A. Wirzba</td>
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<tr>
<td></td>
<td>We 14-17, LH, HISKP, Bonn</td>
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<td>Exercises: 2 hrs in groups</td>
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<tr>
<td>physics711</td>
<td>Particle Astrophysics and Cosmology</td>
<td>S. Böser, M. Kowalski</td>
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<tr>
<td></td>
<td>Mo 14-16, We 9, LH, IAP, Bonn</td>
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<td>Exercises: 1 hr in groups</td>
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<tr>
<td>Course Code</td>
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<tr>
<td>physics715</td>
<td>Experiments on the Structure of Hadrons</td>
<td>A. Gillitzer</td>
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<td></td>
<td>Mo 10-12, SR II, HISKP, Bonn</td>
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<td>Exercises: 1 hr in groups</td>
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<tr>
<td>physics752</td>
<td>Superstring Theory</td>
<td>A. Klemm</td>
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<td>Tu 12, Fr 13-15, LH I, Pl, Bonn</td>
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<tr>
<td>physics766</td>
<td>Physics of Higgs Bosons</td>
<td>M. Drees</td>
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<td>Tu 14-16, Fr 12, LH I, Pl, Bonn</td>
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<tr>
<td>53104</td>
<td>Tools for Particle Physics</td>
<td>D. Gotta, S. Schadmand, H. Ströher</td>
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<td>2 hrs on agreement, SR IKP, Cologne</td>
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<td>2 hrs We 14-15.30, SR IKP, Cologne</td>
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<tr>
<td>53410</td>
<td>Advanced Seminar on Heavy Ion Physics</td>
<td>P. Reiter</td>
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<td>2 hrs Th 14-15.30, Lib IKP, Cologne</td>
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<tr>
<td>53411</td>
<td>Advanced Seminar on Accelerator Mass Spectrometry: Methods and Applications</td>
<td>A. Dewald</td>
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<td>2 hrs Th 12-13.30, SR IKP, Cologne</td>
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**Astronomy and Astrophysics**

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<tr>
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<tbody>
<tr>
<td>astro801</td>
<td>Introduction to Astrophysics</td>
<td>U. Klein</td>
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<tr>
<td></td>
<td>Details to be announced, Bonn</td>
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<tr>
<td>astro811</td>
<td>Stars and stellar evolution</td>
<td>R. Izzard, N. Langer</td>
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<tr>
<td></td>
<td>Th 9-11, R 0.012, Alfa, Fr 9, Cip-Pool, Alfa,</td>
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<tr>
<td></td>
<td>Exercises: 2 hrs in groups</td>
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<tr>
<td>astro812</td>
<td>Cosmology</td>
<td>C. Porciani, P. Schneider</td>
</tr>
<tr>
<td></td>
<td>Tu 10-13, R 0.012, Alfa, Bonn</td>
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<td>Exercises: 1 hr in groups</td>
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<tr>
<td>astro841</td>
<td>Radio astronomy: tools, applications and impacts</td>
<td>U. Klein</td>
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<td>Experiences arranged by appointment</td>
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<tr>
<td>astro8503</td>
<td>Dark matter and dark energy explored by radio and x-ray observations</td>
<td>J. Kerp, T. Reiprich, Y. Zhang</td>
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<td>Experiences/lab course arranged by appointment</td>
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<tr>
<td>astro853</td>
<td>The physics of the dense stellar systems</td>
<td>P. Kroupa</td>
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<tr>
<td>astro854</td>
<td>Numerical gravitational dynamics</td>
<td>J. Pfann-Altenburg</td>
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<tr>
<td></td>
<td>Experiences arranged by appointment</td>
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<tr>
<td>astro856</td>
<td>Quasars and microquasars</td>
<td>M. Massi</td>
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<tr>
<td>astro857</td>
<td>Star formation</td>
<td>F. Bertoldi</td>
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<tr>
<td></td>
<td>Experiences: 1 hr in groups</td>
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<tr>
<td>astro891</td>
<td>Seminar on cosmology</td>
<td>C. Porciani, T. Reiprich, P. Schneider</td>
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<tr>
<td>astro892</td>
<td>Seminar on radio astronomy</td>
<td>F. Bertoldi, J. Ker, U. Klein, M. Kramer, M. Massi, K. Menten</td>
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<td>Initial meeting see astro 894</td>
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<tr>
<td>astro893</td>
<td>Seminar on stars, stellar systems, and galaxies</td>
<td>R. Izzard, P. Kroupa, J. Pfann-Altenburg</td>
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<td>Initial meeting see astro 894</td>
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<tr>
<td>6952</td>
<td>Seminar on theoretical dynamics</td>
<td>P. Kroupa, J. Pflamm-Altenburg</td>
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<td>Fr 14-16, R 3.010, Alfa, Bonn</td>
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<td>6953</td>
<td>Seminar on stellar evolution and hydrodynamics</td>
<td>J. Braithwaite, R. Izzard, N. Langer</td>
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<td></td>
<td>Th 13.30-15, R 3.010, Alfa, Bonn</td>
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<tr>
<td>6954</td>
<td>Seminar on galaxy clusters</td>
<td>T. Reiprich, Y. Zhang</td>
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<td></td>
<td>Th 15-16.30, R 0.008, Alfa, Bonn</td>
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<tr>
<td>6955</td>
<td>Seminar on selected problems in extragalactic astronomy and cosmology</td>
<td>C. Porciani, P. Schneider</td>
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<td>Th 16-18, R 3.010, Alfa, Bonn</td>
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<tr>
<td>6964</td>
<td>Seminar on technical and computational aspects of astronomy</td>
<td>R. Izzard</td>
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<td>Fr 9.45-10.45, R 3.010, Alfa, Bonn</td>
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<tr>
<td>physics711</td>
<td>Particle Astrophysics and Cosmology</td>
<td>S. Böser, M. Kowalski</td>
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<td>Mo 14-16, We 9, LH, IAP, Bonn</td>
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<td>53112</td>
<td>Relativity and Cosmology I</td>
<td>C. Kiefer</td>
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<td>4 hrs Mo 16-17.30, We 10-11.30, SR THP,</td>
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<td>Exercises: 2 hrs Th 14-15.30, SR II. PI, Cologne</td>
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<td>53122</td>
<td>Star formation</td>
<td>S. Pfalzner</td>
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<tr>
<td></td>
<td>2 hrs Mo 8-10, CR THP, Cologne</td>
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<td>53126</td>
<td>Astrophysics II</td>
<td>P. Schilke</td>
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<td></td>
<td>4 hrs We 12-13.30, Fr 16-17.30, SR I. PI, Cologne</td>
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<td>Exercises: 1 hr Tu 16-17.30 on agreement</td>
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<tr>
<td>53128</td>
<td>Molecular Physics I</td>
<td>S. Schlemmer</td>
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<td>3 hrs Tu 12-13.30, Fr 8, SR I. PI, SR I. PI, Cologne</td>
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<td>Problem Class: 1 hr Fr 9 SR I. PI, Cologne</td>
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<tr>
<td>53132</td>
<td>Experiments in Molecular Physics</td>
<td>S. Schlemmer</td>
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<td>2 hrs Fr 10-11.30, SR I. PI, Cologne</td>
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<tr>
<td>53133</td>
<td>Galaxy Dynamics</td>
<td>A. Eckart</td>
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<td></td>
<td>2 hrs We 10-11.30, SR I. PI, Exercises: 1 hr Th 13, SR THP, Cologne</td>
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Condensed Matter and Statistical Physics, Photonics

physics613  Condensed Matter Physics  
We 10-12, Fr 9, LH, IAP, Bonn  
Exercises: 1 hr in groups  

physics617  Theoretical Condensed Matter Physics  
Mo 15, Tu 14-16, LH, HISKP, Bonn  
Exercises: 2 hrs in groups  

physics740  Hands-on Seminar: Experimental Optics and Atomic Physics  
Mo 9-11, IAP, Bonn  

physics767  Computational Methods in Condensed Matter Theory  
Tu 13, Th 14-16, SR II, HISKP, Bonn  
Exercises: 2 hrs in groups  

physics772  Physics in Medicine I: Fundamentals of Analyzing Biomedical Signals  
Mo 10-12, We 12, SR I, HISKP, Bonn  
Exercises: 1 hr in groups  

physics652  Seminar on Advanced Topics in Photonics and Quantum Optics  
Fr 10-12, LH, IAP, Bonn  

Astronomy and Astrophysics

53405  Advanced Seminar on Topical Subjects of Astrophysics  
2 hrs Mo 14-15.30, SR I, PI, Cologne  

53407  Advanced Seminar on Relativity and Cosmology  
2 hrs Tu 10-11.30, SR THP, Cologne  

C. Kiefer
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
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<tr>
<td>physics655</td>
<td>Seminar on Selected Topics in Environmental Physics</td>
<td>B. Diekmann</td>
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<td>Th 14-16, SR I, HISKP, Bonn</td>
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<tr>
<td>physics656</td>
<td>Computational Physics Seminar on Analyzing Biomedical Signals</td>
<td>K. Lehnertz, B. Metsch</td>
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<td>Mo 14-16, SR I, HISKP, Bonn</td>
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<td>53100</td>
<td>Condensed Matter Physics I</td>
<td>M. Braden</td>
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<td>3 hrs Tu 10-11.30, Th 12-13.30, SR II. PI, Cologne</td>
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<td>Exercises: 1 hr in groups included</td>
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<td>53108</td>
<td>The Fokker-Planck-Equation: Selected Problems</td>
<td>M. Janßen, J. Hajdu</td>
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<td>2 hrs Mo 17.45-19.15, CR THP, Cologne</td>
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<td>53120</td>
<td>Quantum Field Theory II</td>
<td>T. Quella</td>
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<td>4 hrs We 8-9.30, LH II, Fr 14-15.30, SR I. PI,</td>
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<td>Exercises: 2 hrs Th 10-11.30, SR I. PI, Cologne</td>
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<td>53124</td>
<td>High Temperature Superconductors</td>
<td>J. Röhler</td>
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<td>53128</td>
<td>Molecular Physics I</td>
<td>S. Schlemmer</td>
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<td></td>
<td>3 hrs Tu 12-13.30, Fr 8, SR I. PI,</td>
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<td>Problem Class: 1 hr Fr 9 SR I. PI, Cologne</td>
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<td>53132</td>
<td>Experiments in Molecular Physics</td>
<td>S. Schlemmer</td>
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<td>2 hrs Fr 10-11.30, SR I. PI, Cologne</td>
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<tr>
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<td>45th IFF-Spring School, 10-21 March 2014</td>
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<td>see: <a href="http://www.iff-springschool.de">http://www.iff-springschool.de</a></td>
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<td>2-dimensional physical properties”</td>
<td>Lorenz</td>
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<td>2 hrs Mo 14-15.30, SR II. PI, Cologne</td>
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<td>First meeting: Mo 14.10.2013, 14 h</td>
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<td>see: <a href="http://www.ph2.uni-koeln.de/235.html">http://www.ph2.uni-koeln.de/235.html</a></td>
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BCGS Grand Opening

We cordially invite all BCGS members to our welcome party for our new students. The festive event to open the academic year will take place

November 11th, 2013
Wolfgang-Paul Hörsaal,
Kreuzbergweg 28 in 53115 Bonn

The colloquium talk will be given at 16 h by Professor Helmut Rauch (Vienna University of Technology) on “Neutrons as quantum objects: manipulation and storage”.

The complete program will be presented on our webpage before long.

Please note that the colloquium talk is also part of the “Wolfgang Paul Symposium”, which is held in Bonn on the occasion of Wolfgang Paul’s 100th birthday this year.
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