



universität**bonn**

Universität zu Köln



Bonn-Cologne Graduate School  
of Physics and Astronomy

# Course Overview

Winter Term 2009/2010

bcgs





# BCGS Course Overview

## Winter Term 2009

This list of courses provides an overview of lectures and seminars offered within the Master and Diploma 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 “early-on-research”.

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. Courses offered at only one University are marked with a star, e.g. the complementary course offers of Biophysics (Cologne) or Photonics (Bonn).

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
- Zùlpicher 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




Complementary Lectures/Seminars




# Special BCGS Courses

## Lectures

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physics615 6196 	Theoretical Particle Physics Tu 16-18, Fr 12, LH I, PI, Bonn The lecture is broadcasted to Cologne: SR I. PI Exercises: 2 hrs in groups	<i>H.P. Nilles</i>
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6804 6197 	Experimental Particle Physics 3 hrs Tu 13-16, Lib IKP, Cologne	<i>K. Desch</i>
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## Seminars

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physics655 6236 	Seminar on AdS/CFT Correspondence in Particle Physics and Condensed Matter Mo 16-18, in turn LH I, PI, Bonn, Lib IKP, Cologne Organizational meeting: Mo 19.10., 16.30, in Cologne and Bonn (video conf) see <a href="http://www.thp.uni-koeln.de/~mandt/ADS.html">http://www.thp.uni-koeln.de/~mandt/ADS.html</a>	<i>S. Förste, A. Klemm, J. Kroha, A. Rosch, M. Zirnbauer</i>
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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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physics717	High Energy Physics Lab, Bonn 4 to 6 weeks on agreement	<i>E. von Törne</i>
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physics732	Optics Lab, Bonn 4 to 6 weeks on agreement <a href="http://www.iap.uni-bonn.de/opticslab/">http://www.iap.uni-bonn.de/opticslab/</a>	<i>K. Buse, M. Fiebig, D. Meschede, F. Vewinger, M. Weitz</i>
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6199	Miniforschung (Internship during semester break for advanced students), Cologne	<i>Professors and Lecturers of the Physics Institutes</i>
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## Special BCGS Courses

### Intensive Courses

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physics719	BCGS Intensive Week: Particle Physics at the Energy Frontier, Bonn block course, 28.09.-03.10.2009 <a href="http://www.uni-bonn.de/~etoerne/teaching/intensive-week09/">http://www.uni-bonn.de/~etoerne/teaching/intensive-week09/</a>	<i>E. von Törne</i>
physics737	BCGS Intensive Week: Understanding and Building a Magneto-optical trap, Bonn 1 week, 22.02.-27.02.2010, see page 12	<i>F. Vewinger, A. Widera</i>

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### General Courses



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physics601	Advanced Laboratory Course 3 + 2 hrs in groups	<i>U. Blum, K. Desch, S. Goertz W. Hillert, R. Jahn, U. Klein, K. Peithmann</i>
physics606	Advanced Quantum Theory Tu 13, LH I, PI, Th 10-12, LH, HISKP, Bonn Exercises: 2 hrs in groups	<i>H. Monien</i>
physics607	Advanced Theoretical Physics Mo 10-12, We 14, LH I, PI, Bonn Exercises: 2 hrs in groups	<i>H. Dreiner</i>
physics754	General Relativity and Cosmology Th 9, Fr. 8-10, LH, HISKP, Bonn Exercises: 2 hr in groups	<i>S. Förste</i>
astro801	Introduction to astrophysics Details to be announced Exercises arranged by appointment	<i>U. Klein</i>
6170	Statistical Physics II 4 hrs Tu 16-17.30, SR THP, We 10-11.30, LH III, Cologne Exercises: 2 hrs Mo 10-11.30, LH II, Cologne	<i>M. Lässig</i>

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6171	Advanced Quantum Mechanics 4 hrs Mo 12-13.30, Tu 8-9.30, SR THP, Cologne Exercises: 2 hrs We on agreement	<i>M. Zirnbauer</i>
6188	Introduction to Mathematica - A Tool for Physics and Astronomy 2 hrs Tu 10-11.30, CIP-Lab, Cologne	<i>M. Röllig</i>
6198	Presentation of Research Groups 2 hrs We 12-13.30, biweekly, LH II, Cologne see <a href="http://www.physik.uni-koeln.de/">http://www.physik.uni-koeln.de/</a>	<i>Professors and Lecturers of the Physics Institutes</i>

## Particle and Nuclear Physics

physics612	Particle Physics Tu 8-12, Th 16, SR I, HISKP, Bonn Exercises: 1 hr in groups	<i>F. Klein</i>
physics612	Accelerator Physics We 10-12, SR I, HISKP, Th 12, LH, IAP, Bonn Exercises: 1 hr in groups	<i>W. Willert, R. Maier</i>
physics616 	Theoretical Hadron Physics We 10-13, SR II, HISKP, Bonn Exercises: 2 hrs in groups	<i>C. Hanhart, A. Nogga, A. Wirzba</i>
physics618	Physics of Particle Detectors Mo 14-16, Tu 12, LH, IAP, Bonn Exercises: 1 hr in groups	<i>N. Wermes</i>
physics639 	Advanced Topics in High Energy Particle Physics Mo 9, LH, IAP, Tu 10-12, SR II, HISKP, Bonn Exercises: 1 hr in groups	<i>M. Cristinziani</i>
physics711	Particle Astrophysics and Cosmology Mo 12, We 8-10, SR I, HISKP, Bonn Exercises: 1 hr in groups	<i>M. Kowalski</i>

## Particle and Nuclear Physics

physics715 ★	Experiments on the Structure of Hadrons Th 14-16, LH, HISKP, Bonn Exercises: 1 hr in groups	<i>A.Gillitzer</i>
physics758 ★	Quantum Chromodynamics Th 8, Fr 10-12, LH, HISKP, Bonn Exercises: 2 hrs in groups	<i>H.-W. Hammer</i>
6800 ★	Theoretical Nuclear Physics We 15-18, SR II, HISKP, Bonn including 1 hr of exercises	<i>E. Epelbaum, S. Krewald</i>
6801 ★	Collider Physics Tu 12, Fr 14-16, LH I, PI, Bonn Exercises: 2 hrs in groups	<i>M. Drees</i>
physics651 ★	Seminar on Current Topics in Experimental Particle Physics Mo 11-13, room 300 PI, Bonn	<i>K. Desch, J. Kroseberg, E. von Törne, N. Wermes</i>
physics654 ★	Seminar on Topological Effects in Quantum Field Theory Tu 14-16, SR II, HISKP, Bonn	<i>B. Kubis, U. Meißner, A. Rusetsky</i>
physics657 ★	Seminar on Event-by-Event Data Analysis of a Pion-Photoproduction Experiment at ELSA Mo 15-17, CR, HISKP, Bonn	<i>R. Beck, H. Schmieden</i>
6176	Tools for Particle Physics 2 hrs on agreement, SR IKP, Cologne	<i>M. Büscher, D. Gotta, H. Ströher, S. Schadmand</i>
6177	Physics of Detectors 3 hrs Mo 10-11.30, Tu 11, SR IKP, Cologne	<i>A. Dewald</i>
6187 ★	Nuclear Physics II 3 hrs Mo 14-14.45, We 16-17.30, SR IKP, Cologne	<i>P. Reiter</i>
6223 ★	Advanced Seminar on Nuclear Physics 2 hrs We 14-15.30, SR IKP, Cologne	<i>M. Büscher, D. Gotta, J. Jolie, P. Reiter, A. Zilges, H. Ströher, A. Dewald, K.O. Zell</i>



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6225                      Advanced Seminar on Accelerator                      *A. Dewald*  
★                              Mass Spectroscopy  
2 hrs Fr 14-15.30, SR THP, Cologne

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6227                      Advanced Seminar on Heavy Ion Physics                      *P. Reiter*  
★                              2 hrs Th 14-15.30, Lib IKP, Cologne

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6267                      Seminar Nuclear Physics with Stored Ions                      *A. Blazhev*  
★                              2 hrs We 10-11.30, Lib IKP, Cologne

## Astronomy and Astrophysics

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astro811                      Stars and Stellar Evolution                      *N. Langer*  
★                              Th 9-11, Fr 9, LH Astronomy, Bonn  
Exercises arranged by appointment

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astro812                      Cosmology                      *P. Schneider*  
Mo 16-19, LH 0.01, MPIfR, Bonn  
Exercises: 1 hr in groups

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astro841                      Radio Astronomy: tools, applications, and impacts                      *U. Klein, K. Knudsen*  
Tu 16, Th 16-18, LH Astronomy, Bonn  
Exercises: Mo 12, R. 0.05, Bonn

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astro842                      Submillimeter astronomy                      *K. Menten, F. Bertoldi*  
Th 11-13, LH 0.01, MPIfR, Bonn

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astro843                      Astronomical interferometry and digital                      *G. Weigelt*  
★                              image processing  
We 15.30-17, LH 0.02, MPIfR, Bonn

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astro853                      The physics of dense stellar systems                      *P. Kroupa*  
Tu 10-12, R. 3.19, Bonn  
Exercises arranged by appointment

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astro854                      Numerical gravitational dynamics                      *H. Baumgardt, P. Kroupa*  
Th 14-16, R. 3.19, Bonn  
Exercises arranged by appointment

## Astronomy and Astrophysics

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astro855 	Radio and X-ray observations of dark matter and dark energy Fr 13-15, LH 0.01, MPIfR, Bonn	<i>J. Kerp, T. Reiprich</i>
astro856	Quasars and microquasars Th 9-10.30, LH 0.01, MPIfR, Bonn	<i>M. Massi</i>
astro857	Star formation We 10-12, LH 0.01, MPIfR, Bonn	<i>B. Parise, J. Jørgensen</i>
astro891 	Seminar on cosmology and selected problems in gravitational lensing research Tu 14-16, R. 3.19, Bonn	<i>P. Schneider and staff</i>
astro892	Seminar on radio astronomy Th 14, R. 0.05, Bonn	<i>U. Klein, F. Bertoldi, J. Jørgensen, M. Massi, K. Menten</i>
astro893	Seminar on star clusters and dwarf galaxies Fr 14-16, R. 3.19, Bonn	<i>H. Baumgardt, P. Kroupa</i>
6954 	Practical radio interferometry We 13-16, R. 0.05, Bonn	<i>W. Flemmings, F. Bertoldi, O. Wucknitz, J. Jørgensen</i>
6956 	The cosmic history of the intergalactic medium Mo 10-12, LH Astronomy, Bonn	<i>C. Porciani</i>
6957	Selected applications of general relativity in astrophysics We 10-12, R. 0.05, Bonn	<i>O. Wucknitz</i>
6965	Seminar on theoretical dynamics Fr 9.30-11, R. 3.19, Bonn	<i>H. Baumgardt, P. Kroupa</i>
6968 	Seminar on strong gravitational lensing and lens modelling Fr 16-18, R. 3.19, Bonn	<i>O. Wucknitz</i>
6969 	Statistical methods in astrophysics Mo 11-13, R. 3.19, Bonn	<i>P. Schneider and staff</i>

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6971	Seminar on galaxy clusters We 16-17.30, R. 3.19, Bonn	<i>T. Reiprich</i>
physics711	Particle Astrophysics and Cosmology Mo 12, We 8-10, SR I, HISKP, Bonn Exercises: 1 hr in groups	<i>M. Kowalski</i>
6178	Astrophysics II 4 hrs Tu 10-11.30, Th 12-13.30, SR I. PI, Cologne Exercises: 1 hr on agreement	<i>A. Eckart, C. Straubmeier, S. Pfalzner</i>
6180 	Modern Methods of Molecular Physics 2 hrs Fr 10-11.30, LH III, Cologne	<i>T. Giesen</i>
6184 	Relativity and Cosmology II 4 hrs Tu 12-13.30, Th 10-11.30, SR IKP, Exercises: 2 hrs We 12-13.30, CR THP, Cologne	<i>C. Kiefer</i>
6186	Computational Astrophysics 3 hrs Mo 8-9.30, and on agreement, SR I. PI, Practical Course: 3 hrs on agreement, Cologne	<i>S. Pfalzner</i>
6191 	Molecular Physics I 3 hrs Mo 10-11.30, Tu 12, 1 hr Tu 13 Problem Class, SR I. PI, Cologne	<i>S. Schlemmer, T. Giesen</i>
6193 	Astrochemistry 2 hrs We 10-11.30, SR I. PI, Cologne	<i>S. Schlemmer</i>
6220	Advanced Seminar on Current Problems in Physics and Astrophysics "Interstellar Medium and Diagnostics" 2 hrs Mo 16-17.30, SR I. PI, Cologne	<i>A. Eckart, P. Schilke, S. Schlemmer, J. Stutzki</i>
6221	Advanced Seminar on Current Problems in Theoretical Astrophysics 2 hrs Tu 9-10.30, SR I. PI, Cologne	<i>S. Pfalzner</i>
6228 	Advanced Seminar on Relativity and Cosmology 2 hrs Fr 12-13.30, SR II. PI, Cologne	<i>C. Kiefer</i>

# Condensed Matter and Statistical Physics, Photonics

physics613	Condensed Matter Physics We 10-12, Th 12, LH, HISKP, Bonn Exercises: 1 hr in groups	<i>P.-D. Eversheim, R. Vianden</i>
physics614 	Laser Physics and Nonlinear Optics Tu 10, Th 14-16, LH, IAP, Bonn Exercises: 1 hr in groups	<i>M. Weitz</i>
physics617	Theoretical Condensed Matter Physics Tu 14-16, Th 12, LH I, PI, Bonn Exercises: 2 hrs in groups	<i>J. Kroha</i>
physics619 	Photonics Tu 11, Th 8-10, LH, IAP, Bonn Exercises: 1 hr in groups	<i>F. Vewinger</i>
physics652 	Seminar on Recent Topics in Optics and Light-Matter Interaction Tu 14-16, LH, IAP, Bonn	<i>M. Fiebig, M. Weitz</i>
physics653 	Seminar on Current Experiments in Quantum Control and Information Technology Tu 14-16, CR, IAP, Bonn	<i>D. Meschede, F. Vewinger A. Widera</i>
physics656	Computational Physics Seminar on Analyzing Biomedical Systems Mo 14-16, SR II, HISKP, Bonn	<i>K. Lehnertz</i>
physics771 	Environmental Physics & Energy Physics Th 13.30-15, LH 118, AVZ 1, Bonn	<i>B. Diekmann</i>
physics772	Physics in Medicine I: Fundamentals of Analyzing Biomedical Systems Mo 9, Fr 10-12, SR I, HISKP, Bonn Exercises: 1 hr in groups	<i>K. Lehnertz</i>

6802	Chaos und Integrabilität in mesoskopischer Physik Th 16-18, SR II, HISKP, Bonn	<i>O. Zaitsev</i>
6174	Superconductivity 2 hrs Tu 12-13.30, SR II. PI, Cologne	<i>M. Abd-Elmeguid</i>
6175 ★	Introduction to Neutron Scattering 2 hrs Tu 14-15.30, SR II. PI, Cologne	<i>M. Braden</i>
6179	Solid State Theory I 3 hrs lectures and 1 hr tutorial, biweekly, Tu & Th 12-13.30, SR THP, Cologne	<i>T. Emig</i>
6181	Computational Soft Matter Physics 2 hrs Tu 14-15.30, SR THP, Cologne	<i>G. Gompper</i>
6182 ★	Solid State Physics II 4 hrs Tu 10-11.30, CR THP, Fr 10-11.30, SR II. PI, Cologne	<i>M. Grüninger</i>
6183 ★	Physics of Glasses 2 hrs Th 10-11.30, SR II. PI, Cologne	<i>J. Hemberger</i>
6185 ★	Physics of Surfaces and Nanostructures 2 hrs Th 10-11.30, LH III, Cologne	<i>T. Michely</i>
6189 ★	High Temperature Superconductors 2 hrs Fr 14-15.30, SR II. PI, Cologne	<i>J. Röhler</i>
6190 ★	Quantum Field Theory II 4 hrs We 14-15.30, Fr 10-11.30, SR THP, Exercises: 2 hrs Tu 16-17.30, SR IKP, Cologne	<i>A. Rosch</i>
6194 ★	Electronic Structure 2 hrs Mo 12-13.30, SR II. PI, Exercises: 1 hr Fr 12, SR IKP, Cologne	<i>L.H. Tjeng</i>

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6195	Physikalische Grundlagen der Medizinischen Bildgebung Blockkurs 40 h, 01.03.-12.03.2010, 9-12.30, Cologne	<i>H. Treuer, S. Hunsche</i>
6206	Spintronics: From Electron Correlations to Functional Materials 41st IFF-Spring School, March, 8th-19th 2010 see: <a href="http://www.fz-juelich.de/iff/ferienschule">http://www.fz-juelich.de/iff/ferienschule</a>	<i>P.S. Bechthold, C. Buchal, D. E. Bürgler, G. Gompper, P. Grünberg, R. Wördenweber</i>
6222 	Advanced Seminar on Current Problems in Solid State Physics 2 hrs Mo 14-15.30, SR II. PI, Cologne	<i>M. Abd-Elmeguid, M. Braden, M. Grüninger, T. Michely, L.H. Tjeng</i>
6231 	Advanced Seminar on Evolutionary Dynamics 2 hrs We 12-13.30, SR I. PI, Cologne	<i>A. Altland, J. Krug, M. Lässig</i>
6235 	Seminar on Biological Physics 2 hrs Tu 14-15.30, LH I, Cologne	<i>M. Lässig</i>

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## **BCGS Intensive Week: Understanding and Building a Magneto Optical Trap**

22.02.-27.02.2010

Guided by a combination of lectures, seminar talks and practical training, the participants will set up and operate a magneto-optical trap to trap a cloud of Rubidium atoms, and the characteristics of the trap will be determined.

Participation is limited to 12 participants, and the place will be distributed first come, first serve, so an early application is recommended: <http://tiny.iap.uni-bonn.de/bcgs/physics737.php>





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