汉堡大学“2016 年博士生招生面试交流会”通知

致有兴趣参加 2016 年 11 月 19 日到 20 日在北京及 2016 年 11 月 22 日在上海举办的“2016 年博士生招生面试交流会”的同学们。

亲爱的有志于攻读博士学位的同学们：

如果您有意申请德国汉堡大学数学、信息工程和自然科学学院（简称 MIN）博士项目，我们诚挚地邀请您参加“2016 年博士生招生面试交流会”（活动时间及地点：2016 年 11 月 19 日-20 日在北京及 2016 年 11 月 22 日在上海）。您将在该交流会上得到学院专家的专业建议和指导。

近年来，德国最盛名的高等院校研究机构之一汉堡大学数学、信息工程和自然科学学院在教学和科研方面获得了很高的声誉。赴 MIN 攻读博士学位意味着您将获得顶级的研究经历，将能用英文或德文进行研究以及撰写博士论文，将获得国际认可的博士学位。博士生不需要缴纳学费，只需支付少量的学期管理费。您也将在世界上最具吸引力的城市之一---德国汉堡市生活和学习，体验这个文化大都市的包容与开放。

MIN 不仅能为您提供德国最先进的研究设备和最宽松活跃的研究环境，还将帮助您获得达成目标以及获得成功的其它技能。目前学院有 200 位教授和 370 位博士后研究助理任教，他们负责指导学院 8500 位学生，其中包括 1500 位博士学生（冬季学期 2014 / 2015）和 1800 位培训教师。汉堡大学数学、信息工程和自然科学学院（MIN）由生物学系，化学系，地球科学系，信息科学系，数学系和物理系组成。除了这些学科领域，MIN 还发展了跨学科性的重点研究领域，其中包括两个优秀的研究项目 CliSAP 和 CUI：

https://www.promovieren.uni-hamburg.de/en/min/forschung.html

如果您想要了解汉堡大学数学，信息工程和自然科学学院的博士研究的详细信息，

请见：https://www.promovieren.uni-hamburg.de/en/min

汉堡大学数学、信息工程和自然科学学院（MIN）国际研究生院将为有意申请博士生的同学提供短期访问机会。申请者将通过短期访问的机会更深入地了解申请过程，获取特殊的跨学科性课题的详细信息以及实地考察学院和了解城市的相关信息。申请人将获得交通和最长一个月的住宿补助。有兴趣赴 MIN 攻读博士学位的同学可随时申请该奖学金。

MIN 短期访问奖学金信息请详见：
https://www.min.uni-hamburg.de/en/min-graduiertenschule/min-graduiertenschule-international/stipendien/kennenlernaufenthalte.html

学院负责国际化及帮助年轻研究人员的副院长、博士生导师 Gasser 教授将于 2016 年 11 月 19 日在北京的“2016 年博士生招生面试交流会”上做题为“在德国汉堡大学数学、信息工程和自然科学学院攻读博士学位”的报告。非常欢迎您来参加该信息报告会。

具体的会议议程请见：www.phdchina.org。

请通过 iSchedule 在线预约系统（www.phdchina.org）进行参会注册，以便您能提前通过 e-mail 和 skype 等方式与汉堡大学数学、信息工程和自然科学学院(MIN)负责咨询工作的老师进行联系。iSchedule 在线预约系统能让您不受时间和地点的限制随时预约和博士生导师 Gasser 教授在北京和上海交流会上的面谈。教授将在个人面谈时间为大家答疑解惑，如对申请程序的疑问，您也可以了解到申请该博士项目的具体要求。

我们期待与您在 11 月举办的“2016 年博士生招生面试交流会”上见面和交流。欢迎您来到德国北部最大的教育与科研机构汉堡大学继续深造！

祝好

德国汉堡大学数学、信息工程和自然科学学院

大学和学院的网站链接：

- 汉堡大学数学、信息工程和自然科学学院:
https://www.min.uni-hamburg.de/en.html

- 汉堡大学数学、信息工程和自然科学学院博士招生信息:

https://www.promovieren.uni-hamburg.de/en/min.html

- 汉堡大学主页: https://www.uni-hamburg.de/

- 院系联系人: Janie Wermter 博士: Janie.Wermter@uni-hamburg.de

附研究方向简介及院系联系方式：

SUGGESTED TOPICS FOR DOCTORAL RESEARCH
PHD WORKSHOP CHINA 2016
Website of Universität Hamburg, Germany: https://www.uni-hamburg.de/en.html
Website of the MIN Faculty: https://www.min.uni-hamburg.de/en.html
MIN-Gateway for doctoral Candidates:
https://www.promovieren.uni-hamburg.de/en/min
For general enquiries: Dr. Janie Wermter, janie.wermter@uni-hamburg.de

DEPARTMENT/INSTITUTE: BIOINFORMATICS
RESEARCH AREAS: Cheminformatics/Computer-aided molecular design
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Computer-guided discovery and optimisation of anti-infectives
DETAILS (E.G.: GOALS; USEFULL SKILLS): We are an international team currently active in about 15 multi-disciplinary research programmes to guide the identification and development of new anti-infective drugs using computational methods (http://zbh.uni-hamburg.de/acm). Within the envisaged project(s) you will develop and apply novel computational methods and models for the identification and design of promising compounds, which will be synthesised and tested by our collaborators in an iterative optimisation process. You may also conduct some wet-lab experiments yourself if you like. One focus could be the research of traditional Chinese medicines and natural products. A background in fields related to chemistry or biology and affinity to working with computers is desirable. Several more topics related to this field are available.
E-MAIL CONTACT: Prof. Dr. Johannes Kirchmair: kirchmair@zbh.uni-hamburg.de
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RESEARCH AREAS: Cheminformatics/Computer-aided molecular design
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Modeling the metabolism of drugs, cosmetics and agrochemicals
DETAILS (E.G.: GOALS; USEFULL SKILLS): The ability to predict the metabolic properties of small molecules is of key importance to the development of drugs, cosmetics, agrochemicals etc. The aim of the envisaged project(s) can be the development and application of computational methods and models for predicting the (a) interaction of small molecules with enzymes involved in xenobiotic metabolism, (b) metabolic stability of small molecules and (c) chemical structure of metabolites. Various computational methods can be developed and applied: Protein modelling, molecular dynamics simulations, machine learning, QSAR etc. A background in

fields related to chemistry or biology and affinity to working with computers is desirable. Topics will be adapted to fit the profile of the prospective Ph.D. student.
E-MAIL CONTACT: Prof. Dr. Johannes Kirchmair: kirchmair@zbh.uni-hamburg.de

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RESEARCH AREAS: Cheminformatics
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Computational approach for predicting the biomolecular targets of small molecules
DETAILS (E.G.: GOALS; USEFULL SKILLS): Small molecules such as drugs or drug candidates often bind to more than one biomacromolecule. This can cause synergistic or adverse effects. The aim of this project is the development and application of a new computational method for predicting the likely targets of small molecules such as drugs, drug candidates and natural products (in particular those related to traditional Chinese medicine). Topics and methods will be adapted to fit the profile of the prospective Ph.D. student, who should have a background in chemistry, biology, computer science or related areas. For more information visit our website at http://zbh.uni-hamburg.de/acm.
E-MAIL CONTACT: Prof. Dr. Johannes Kirchmair kirchmair@zbh.uni-hamburg.de

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RESEARCH AREAS: Cheminformatics and Computer-Aided Molecular Design
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Computational Method Development for the Search and Design of Small, Bioactive Compounds
DETAILS (E.G.: GOALS; USEFULL SKILLS): The development of small bioactive compounds in pharmaceutical, agrochemical, and biotechnological research is highly supported by computational approaches. The aim of this theses is the development of novel computational methods, for example for virtual screening, protein-structure-based design, or chemical space management. Our approaches are driven by computational efficiency and precise chemical modeling on the one hand and usability and reliability on the other. The AMD group (Prof. Rarey) in Hamburg belongs to the internationally leading groups in this area. Applicants should have a very good background in computer science as well as (bio-)chemistry. Good object-oriented programming skills (preferably C++) as well as communication skills are mandatory.
E-MAIL CONTACT: Prof. Dr. Matthias Rarey: rarey@zbh.uni-hamburg.de

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DEPARTMENT/INSTITUTE: BIOLOGY
RESEARCH AREAS: Microbiology

PROPOSED TOPIC FOR DOCTORAL RESEARCH: CripsR/Cas gene functions beyond defense in the genus Burkholderia
DETAILS (E.G.: GOALS; USEFULL SKILLS): The genus Burkholderia consists of nearly 40 species and encompasses many human- and plant-pathogenic ß-Proteobacteria but also non-pathogenic soil bacteria (1). Among them are several species classified into risk group 3 organisms. Currently 587 complete or nearly complete genomes are publicly available. A detailed search in these genomes turned out that interestingly, only few strains encode for complete CRISPR-cas gene clusters. Within this framework, we are now seeking to identify the roles of CRISPR-cas in PG1 besides its obvious role for immunity.
E-MAIL CONTACT: Prof. Dr. Wolfgang Streit: wolfgang.streit@uni-hamburg.de

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RESEARCH AREAS: Microbiology
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Emerging infections: The role of Stenotrophomonas maltophilia
DETAILS (E.G.: GOALS; USEFULL SKILLS): Stenotrophomonas maltophilia has been frequently isolated from cystic fibrosis patients, can cause numerous infections in other organs and tissues, and is difficult to treat due to antibiotic resistances. S. maltophilia K279a produces the L1 and L2 β-lactamases in response to β-lactam treatment. We are interested in the cellular variabilioty of this organism and its resistance mechanisms used to populate lung tissues.
E-MAIL CONTACT: Prof. Dr. Wolfgang Streit: wolfgang.streit@uni-hamburg.de

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RESEARCH AREAS: Cell and molecular biology
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Control of meiotic recombination in basic science and for breeding applications
DETAILS (E.G.: GOALS; USEFULL SKILLS): Background in molecular biology is needed.
E-MAIL CONTACT: Prof. Dr. Arp Schnittger: arp.schnittger@uni-hamburg.de

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RESEARCH AREAS: Molecular Biology/ Cell Biology
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Functional analysis of neuroglobin and cytoglobin in cell culture system
DETAILS (E.G.: GOALS; USEFULL SKILLS): Globins are small heme-proteins that play an important role in the oxygen metabolism. Hemoglobin and myoglobin are among the best-known and best-investigated proteins in biomedical sciences, and model to study protein function and evolution. Surprisingly, additional vertebrate

globins have been discovered in recent years, with neuroglobin and cytoglobin being the best investigated. Still, their functions are poorly understood. In this PhD project, the ability of different neuroglobin and cytoglobin to augment mitochondrial respiration, to mediate tolerance towards hypoxia and reactive oxygen (ROS), to protect lipids, to protect from apoptosis and their roles in the generation of ROS and nitric oxide will be tested in cell culture systems. This comparative approach will allow evaluating different hypothesis of globin functions.
E-MAIL CONTACT: Prof. Dr. Thorsten Burmester:
thorsten.burmester@uni-hamburg.de

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RESEARCH AREAS: Molecular Plant Physiology
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Control of stem cell activities in plants
DETAILS (E.G.: GOALS; USEFULL SKILLS): Post-embryonic plant development is driven by meristems that contain pluripotent stem cells, which are maintained throughout their lifespan and produce all cells for vegetative and reproductive tissues and organs. It is therefore of utmost importance to keep stem cells intact and prevent DNA damage or genome instability which would cause severe defects when transferred to the next generation. We have identified several new candidate proteins which seem to play an essential role in these processes. By using well-established molecular (DNA and RNA analysis, protein-biochemistry, chromatin-immunoprecipitation) and cell-biological (fluorescence and confocal microscopy, immune-staining, live-cell imaging) methods we are currently analyzing their molecular function and looking for highly motivated and skilled students to join these projects.
E-MAIL CONTACT: Dr. Magdalena Weingartner:
magdalena.weingartner@uni-hamburg.de

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DEPARTMENT/INSTITUTE: CHEMISTRY
RESEARCH AREAS: Organic chemistry
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Structure Elucidation with NMR Spectroscopy
E-MAIL CONTACT: Prof. Dr. Wolfgang Streit: wolfgang.streit@uni-hamburg.de

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RESEARCH AREAS: Physical Chemistry / Nanoscience
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Synthesis of advanced colloidal nanostructures, in particular two-dimensional nanosheets

DETAILS (E.G.: GOALS; USEFULL SKILLS): Goal: new materials for electronic applications, elucidation of growth mechanisms in colloidal nanostructure synthesis, tailoring the properties of nanomaterials; Skills: experience with the colloidal method and complementary experiences.
E-MAIL CONTACT: AK PD Dr. Christian Klinke: klinke@chemie.uni-hamburg.de; Website: www.chemie.uni-hamburg.de/pc/klinke

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RESEARCH AREAS: Physical Chemistry / Nanoscience
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Opto-electronic characterisation of advanced colloidal nanostructures, in particular two-dimensional systems
DETAILS (E.G.: GOALS; USEFULL SKILLS): Goal: Electrical and optical characterization of advanced nanostructures, elucidation of transport mechanisms, device engineering; Skills: experiences with e-beam lithography, electrical transport measurements (at low temperatures and with optical excitation) and complementary methods.
E-MAIL CONTACT: AK PD Dr. Christian Klinke: klinke@chemie.uni-hamburg.de; Website: www.chemie.uni-hamburg.de/pc/klinke

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RESEARCH AREAS: Organic chemistry
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Structure Elucidation with NMR Spectroscopy
E-MAIL CONTACT: Prof. Dr. Arp Schnittger: arp.schnittger@uni-hamburg.de

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RESEARCH AREAS: Organic chemistry
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Structure Elucidation with NMR Spectroscopy
E-MAIL CONTACT: Prof Dr. Stefan Bühler: stefan.buehler@uni-hamburg.de

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DEPARTMENT/INSTITUTE: COMPUTER SCIENCE
RESEARCH AREAS: Intelligent Systems
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Learning Auditory Features by Convolution Neural Networks
DETAILS (E.G.: GOALS; USEFULL SKILLS): Develop a neural network deconvolution process for auditory information; Very good software development

skills in Python.
E-MAIL CONTACT: Prof. Dr. Stefan Wermter:
wermter@informatik.uni-hamburg.de

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RESEARCH AREAS: Intelligent Systems
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Virtual Developmental Robot Interacting with Small Objects
DETAILS (E.G.: GOALS; USEFULL SKILLS): Development of knowledge-based representation for robot-object interaction; Very good software development skills in Python.
E-MAIL CONTACT: Prof. Dr. Stefan Wermter:
wermter@informatik.uni-hamburg.de

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RESEARCH AREAS: Intelligent Systems
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Knowledge-based Language Instructor for a Developmental Robot
DETAILS (E.G.: GOALS; USEFULL SKILLS): Realization of a virtual reality multi-agent conversation scenario for human robot interaction; Very good software development skills in Python.
E-MAIL CONTACT: Prof. Dr. Stefan Wermter:
wermter@informatik.uni-hamburg.de

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DEPARTMENT/INSTITUTE: GEOSCIENCE
RESEARCH AREAS: Seismics / Structural Geology / Fluids
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Fluid and gas migration in a continental suture zone
DETAILS (E.G.: GOALS; USEFULL SKILLS): The primary scientific objective is the understanding of fluid migration from the Paleozoic and Mesozoic reservoirs and source rocks towards the Base Quaternary and the seafloor in the north-western Tornquist Suture Zone. The major questions are: What is the nature of the migration paths? Where does diffuse or focused leakage (seal bypass), and where transportation along carrier beds occur? Where do fluids migrate along faults and how are these faults related to the major graben faults? Do we have evidence for recent plate tectonics? Is the bypass system further controlled by postglacial faulting? There questions can be answered by reflection seismic and hydroacoustic data. The applicant needs skills in seismic data processing and interpretation (tectonics).

E-MAIL CONTACT: Prof. Dr. Christian Hübscher:
christian.huebscher@uni-hamburg.de

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RESEARCH AREAS: Radiation and remote sensing
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Satellite Remote Sensing of Water Vapor and Clouds
DETAILS (E.G.: GOALS; USEFULL SKILLS): Goal: Retrieve atmospheric data products from upcoming meteorological satellites and use them for climate science. Competences needed: Atmospheric Science, Radiative Transfer.
E-MAIL CONTACT: Prof Dr. Stefan Bühler: stefan.buehler@uni-hamburg.de

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DEPARTMENT/INSTITUTE: MATHEMATICS
RESEARCH AREAS: Applied Mathematics, Dynamical Systems, Simulations
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Dynamical Phenomena in Traffic Flow
DETAILS (E.G.: GOALS; USEFULL SKILLS): The dynamics of traffic flow is well understood for a closed circular road. Phenomena like stop and go waves, changes of the in case of bottlenecks etc.are extensively studied (see e.g. I. Gasser, B. Werner: Dynamical phenomena induced by bottleneck, Phil. Trans. R. Soc. A, vol. 368, 4543-4562 (2010).)The situation is different for the case of an open (infinite road). Numerical simualtions show that there are similar phenomena (damped or undamped, stable or unstable oscillations, convective travelling waves etc.). A deeper understanding of such phenomena should make it possible to classify traffic phenomena on the basis of a few crucial quantities.The study of such issues is the main objective of the PhD project.
E-MAIL CONTACT: Prof. Dr. Ingenuin Gasser: gasser@math.uni-hamburg.de

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RESEARCH AREAS: Applied Mathematics, Modelling, Simulations, Optimisation
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Modelling, Simulations and Optimistaion of Renewable Power Stations
DETAILS (E.G.: GOALS; USEFULL SKILLS): Many power stations based on renwable energies involve many modern arguments in applied mathematics. Concepts like parabolic trough or pressure retarded osmosis involve fluid dynamics (gases, liquids or mixtures), special regimes in fluid dynamics (small Mach number), network structures and obviously a strong heat transport. In all this cases mathematical modelling and asymptotic methods are needed to reduce the complexity, simulations

are needed toevaluate the quality of the model and optimisation is needed to optimize the crucial quantities given by the application (e.g. total net power output). Mathematically this reduces to an optimisation problem with fluid dynamic PDE's as constraints.
E-MAIL CONTACT: Prof. Dr. Ingenuin Gasser: gasser@math.uni-hamburg.de

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DEPARTMENT/INSTITUTE: PHYSICS
RESEARCH AREAS: Ultafast Opitcs and X-rays
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Attosecond Science
DETAILS (E.G.: GOALS; USEFULL SKILLS): Ultrafast electron transfer – a process important in photo- and electrochemistry and employed in solid-state solar cells, molecular electronics and single-electron devices – occurs on attosecond timescales. Time-domain attosecond streaking techniques suffer from strong perturbation of the surface by the strong streaking electric field as well as large background signals. The aim here is to develop novel parametric few-cycle pulse sources and to generate intense isolated attosecond XUV and UV pulses via high-harmonic generation for attosecond XUV-pump/UV-probe spectroscopy and to apply to selected catalytic processes.
E-MAIL CONTACT: Prof. Dr. Franz Kärtner: franz.kaertner@desy.de

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RESEARCH AREAS: Ultafast Opitcs and X-rays
PROPOSED TOPIC FOR DOCTORAL RESEARCH: High Energy and High Power Lasers
DETAILS (E.G.: GOALS; USEFULL SKILLS): Various concepts for ultrafast X-ray sources are based on the use of high energy and high power picosecond pulses. They are used for pumping optical parametric chirped pulse amplifiers or as optical undulators in compact Free-Electron Laser sources. The aim is to develop a 1J, few picosecond to ns laser operating at 1kHz repetition rate, i.e. at 1kW of average power. Our approach is based on cryogenic Yb:YAG and Yb:YLF laser technology and applying them to various systems.
E-MAIL CONTACT: Prof. Dr. Franz Kärtner: franz.kaertner@desy.de

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RESEARCH AREAS: Ultafast Opitcs and X-rays
PROPOSED TOPIC FOR DOCTORAL RESEARCH: High Energy THz Generation
DETAILS (E.G.: GOALS; USEFULL SKILLS): Methods and Techniques to generate very high energy THz pulses in the range of 0.1 J at kHz repetition rates are

investigated and demponstrated.
E-MAIL CONTACT: Prof. Dr. Franz Kärtner: franz.kaertner@desy.de

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RESEARCH AREAS: Theoretical physics: ultracold atomic atoms
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Atomtronics: Controlling the tunneling and transport dynamics of ultra-cold atomic systems
DETAILS (E.G.: GOALS; USEFULL SKILLS): By designing scenarios with ultracold atoms loaded into waveguides and lattices, electronic devices such as a transistor can be mimiced. Taking into account the quantum nature of these particles and their mutual interactions, intriguing correlation effects like conditional or pair tunneling arise, which can be utilized for tayloring transport properties. In this PhD project, state-of-the-art wavefunction propagation methods, which resolve all relevant correlations, shall be applied in order to simulate the basic building blocks and processes for "correlated atomtronics" as well as their combination to more complex devices. Useful skills: very good English, very good qualification in theoretical physics and interest in many-body theory, one programming language, programming experience at best.
E-MAIL CONTACT: Dr. Sven Krönke: skroenke@physnet.uni-hamburg.de

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RESEARCH AREAS: Theoretical physics: ultracold atomic atoms
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Correlated non-equilibrium dynamics of ultracold bosonic mixtures in optical lattices
DETAILS (E.G.: GOALS; USEFULL SKILLS): Strongly quenching the interaction strength of ultracold bosonic atoms loaded into a finite optical lattice leads to an intriguing interplay between inter-well tunneling dynamics and intra-well motion (e.g. the dipole mode), which cannot be captured appropriately by the mean-field and the tight-binding approximation. By applying a state-of-the-art wavefunction propagation method taking all relevant correlations into account, such a quench scenario shall be studied for a mixture of two bosonic species in this PhD project, focusing in particular on the interplay between corrlelations and excitation transfer between the species. Useful skills: very good English, very good qualification in theoretical physics and interest in many-body theory, one programming language, programming experience at best.
E-MAIL CONTACT: Dr. Sven Krönke: skroenke@physnet.uni-hamburg.de

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RESEARCH AREAS: Theoretical physics: quantum mechanics
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Local symmetries: theory and

applications
Symmetries provide a cornerstone of physics. All of these symmetries have one thing in common: they are global symmetries which hold for the complete considered system. In the modern science of complex quantum materials, however, it might naturally or by design very well occur that in different spatial domains different local symmetries hold. At Hamburg we have recently developed a theory of local symmetries. The resulting powerful theoretical framework has still many open fundamental questions, some of which will be addressed in the proposed thesis work. This includes also applications such as the formation of perfectly transmitting resonances and quantum localization in a diversity of setups. Useful skills: very good English, very good qualification in theoretical physics, one programming language.
E-MAIL CONTACT: Dr. Sven Krönke: skroenke@physnet.uni-hamburg.de

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RESEARCH AREAS: Theoretical physics: ultracold atomic atoms
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Ultracold atoms in lattices of helix geometry
DETAILS (E.G.: GOALS; USEFULL SKILLS): Tight-binding lattice models form a key paradigm of modern quantum physics, providing a theoretical framework that applies likewise to solid state crystalline systems and ultracold atomic gases exposed to laser light. Tuning the lattice geometry enhances specific inter-site tunneling processes, inducing effective long-range hopping in lattices of helix symmetry as recently studied by the host group within mean-field theory. Based on state-of-the-art numerical tools, this PhD project will address the many-body physics of a helically extended Bose-Hubbard model, characterizing its equilibrium phases and the dynamics triggered by inter-phase quenches. Useful skills: very good English, very good qualification in theoretical (particularly quantum many-body) physics, programming experience.
E-MAIL CONTACT: Dr. Sven Krönke: skroenke@physnet.uni-hamburg.de

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RESEARCH AREAS: Astroparticle Physics
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Searching for light Dark Matter particles: DISH experiment
DETAILS (E.G.: GOALS; USEFULL SKILLS): Extensions of the standard model of particle physics require the existence of new light bosons. Astrophysical observations point towards the existence of such particles which may also explain the existence of cold dark matter. Dedicated laboratory experiments have been suggested and our group is developing and operating new experiments. These experiments share the requirement to detect either extremely low amplitude electric fields or ultra-low

photon fluxes. We offer projects (detector development, optimization and characterization) in this exciting field with emphasis on the development of a new Dark Matter search experiment based on (Horns et al. 2013: arxiv:1212.2970).
E-MAIL CONTACT: Prof. Dr. Dieter Horns dieter.horns@desy.de

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RESEARCH AREAS: Astroparticle Physics
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Propagation of cosmological gamma-rays and the effect of magnetic fields
DETAILS (E.G.: GOALS; USEFULL SKILLS): Extensions of the standard model of particle physics require the existence of new light bosons. Astrophysical observations point towards the existence of such particles which may also explain the existence of cold dark matter. While it is challenging to detect these particles in laboratory experiments, their coupling to photons provides signatures in energy spectra from cosmological gamma-ray sources. We are using observational data from the Fermi-LAT mission, H.E.S.S. as well as CTA to search for energy-dependent effects related to mixing of e.g., photons with light pseudoscalar particles in external magnetic field. Here, we will investigate the effect of the magnetic field present along the line of sight extending upon previous work (see e.g., Horns et al. 2012, arXiv: 1207.0776).
E-MAIL CONTACT: Prof. Dr. Dieter Horns dieter.horns@desy.de

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RESEARCH AREAS: Attosecond Science at Surfaces and Nanostructures
PROPOSED TOPIC FOR DOCTORAL RESEARCH: Time resolved studies at complex surface and nanostructures with an all optical setup
DETAILS (E.G.: GOALS; USEFULL SKILLS): The goal of this project is the development of a new all optical approach to study surface charge migration at plasmoic thinfilm systems. The topic includes the further development of sample preparation and modelling of the theoretical algorithms for data analysis. The experimental investigations may utilize different CEP stable laser systems from pulse energies in the nJ up to the mJ range and pulse durations down to the attosecond regime according to the electron dynamics under investigation.
E-MAIL CONTACT: Prof. Dr. Thorsten Uphues: Thorsten.Uphues@cfel.de