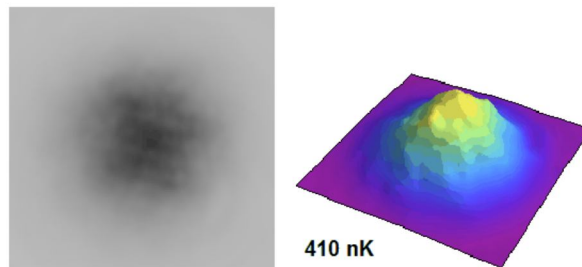


Atomic Physics & Ultracold Quantum Gases



PHY 566/QEII* Fall 2021

* NOTE: SELF-CONTAINED COURSE - NOT PART 2 OF PHY565/QEI

Meeting time and place

Lecture: 6:30PM-7:50PM TuTh
EST

Earth & Space 177

Instructor

[Prof. Dominik Schneble](#)
Dominik.Schneble@stonybrook.edu
(631) 632-8043 or -4497

A-106

Office hours: tba

topics

Review of atomic structure in external fields; atom-light interactions; ultracold collisions; cooling and trapping; Bose-Einstein condensates and their mean-field physics; low-dimensional Bose gases; degenerate Fermi gases; pairing, superfluidity and BEC-BCS crossover; vortices; optical lattices; artificial gauge fields.

Connections to condensed-matter, nuclear, and particle physics, quantum information science, and metrology.

textbooks

None required - detailed lecture notes with chapter references to reviews and textbooks will be posted on Blackboard as the course proceeds.

Recommended: C.J. Pethick & H. Smith: Bose-Einstein-Condensation in Dilute Gases.

grading

~biweekly homework (50%), midterm (15%) & final (15%); term paper (20%).

The midterm and final exams will be take-home exams. All work to be submitted through Blackboard.

learning outcomes

Students who completed this course will have a thorough understanding of basic phenomena in ultracold AMO physics, will be able to describe these phenomena based on quantum mechanics, and will be able to make quantitative estimates for them.

<http://ultracold.physics.sunysb.edu/Courses/PHY566-21.Fall>



ACADEMIC INTEGRITY: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary.

Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html -- **STUDENT ACCESSIBILITY SUPPORT:** If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, 128 ECC Building, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: <https://ehs.stonybrook.edu/programs/fire-safety/emergency-evacuation/evacuation-guide-people-physical-disabilities> and search FireSafety and Evacuation and Disabilities. -- **CRITICAL INCIDENT**

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students' ability to learn. Until/unless the [latest COVID guidance](#) is explicitly amended by SBU, during Fall 2021 "disruptive behavior" will include refusal to **wear a mask** during classes. For the latest COVID guidance, please refer to: <https://www.stonybrook.edu/commcms/strongertogether/latest.php>. -- **ELECTRONIC COMMUNICATION:** Email to your University email account is an important way of communicating with you for this course. For most students the email address is 'firstname.lastname@stonybrook.edu', and the account can be accessed here: <http://www.stonybrook.edu/mycloud>. *It is your responsibility to read your email received at this account.* For instructions about how to verify your University email address see this: <http://it.stonybrook.edu/help/kb/checking-or-changing-your-mail-forwardingaddress-in-the-epo> . You can set up email forwarding using instructions here: <http://it.stonybrook.edu/help/kb/setting-up-mailforwarding-in-google-mail> . If you choose to forward your University email to another account, we are not responsible for any undeliverable messages -- **COURSE MATERIALS AND COPYRIGHT:** Course material accessed from Blackboard, SB Connect, SB Capture or a Stony Brook Course website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the copyright holder is a violation of the Federal copyright law, as well as a violation of Stony Brook's Academic Integrity.

8/2021