

Welcome To the Physics & Astronomy Department Graduate Program

Remco Zegers

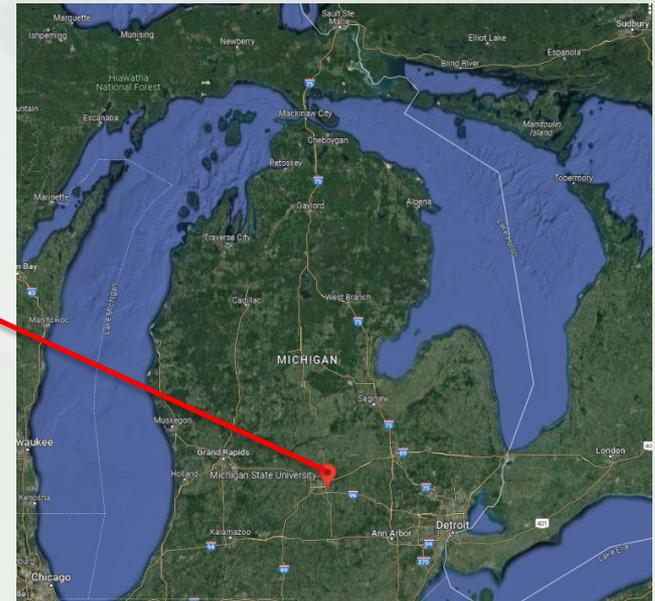
Associate Chair for Graduate Studies and
Graduate Program Director

zegers@msu.edu – BPS 1312 & FRIB 3131



Graduate Program Orientation - 2023

East Lansing
Michigan



Some People in the Department



Department of Physics and Astronomy (PA) Chair - Steve Zepf



Associate Chair and Graduate Program Director - Remco Zegers



Graduate Program Coordinator aka “Mom” - Kim Crosslan



FRIB Associate Director for Education – Heiko Hergert



FRIB Wellness Coach – Rachel Younger

Campus



STEM Teaching

FRIB

**International Center
ID Office**

**Parking
ramp**

BPS

Dairy Store



To Accept Our Offer:

- Send an email to Kim Crosslan (crossla3@msu.edu) and Remco Zegers (Zegers@msu.edu)
- You will also see a notification coming from the online application system Slate.
- Kim will assist in completing admission process
- Deadline: 15 April (same as most other programs)

Today's Agenda

#	Time	Activity	Speaker	Where
1	1:00	Welcome	Remco Zegers (Graduate Program Director)	Main Zoom Session
2	1:30	Research Area Overview 1		Zoom Breakout Rooms
3	1:50	Research Area Overview 2		Zoom Breakout Rooms
4	2:10	Meeting with Graduate Student Organizations		Main Zoom Session
	3:10	Break		
5	3:25	Meet with Faculty 1	20 minutes (5 minutes to switch)	Area Zoom Session
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9	5:45	Virtual tour	FRIB	Area Zoom Session

Research area overviews: Physics Education Research, High Energy Physics, Condensed Matter Physics, Experimental Nuclear (Astro) Physics, Theoretical Nuclear Physics, Accelerator Science - for Bio-Physics: individual meetings this afternoon

You should be able to navigate to break out rooms in the main session

MSU Physics & Astronomy

- MSU has ~50000 students, ~11000 of which pursue graduate and professional degrees
- MSU Physics and Astronomy Department has ~225 graduate students
- MSU has been in the top 3 of highest Research & Development expenditures in physics in the US
- ~80 faculty (with joint appointments)
- Has Leonardo DiCaprio and Jennifer Lawrence of members of the department...



Don't Look Up

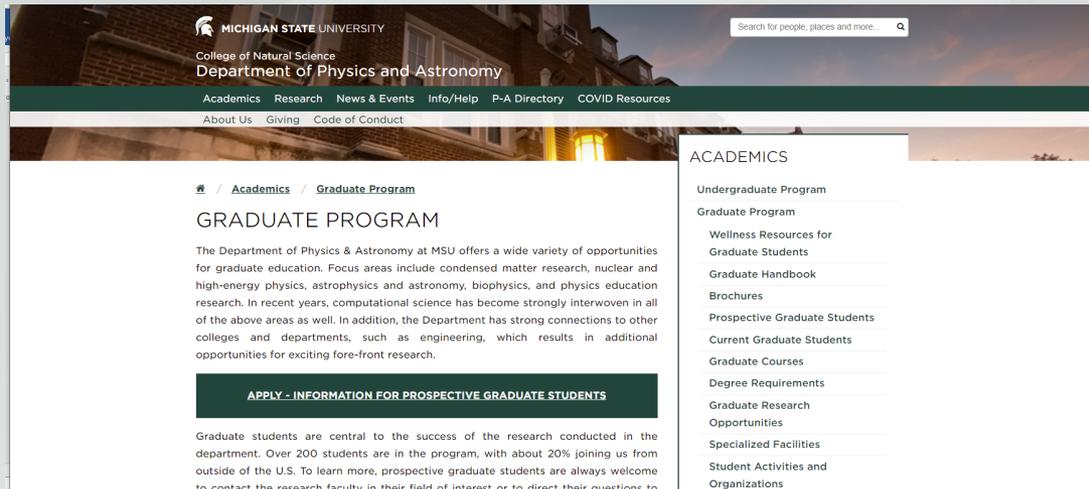
Financial Support: Provide Funding Throughout Your Time in the Program and While Making Progress Towards Your Degree – We Have Been Successful in Doing So For Many Years and Aim to be **Supportive and Flexible**

- Teaching Assistantships (TA)
 - Official MSU Appointments (employment) – Most students are TAs initially
 - Teaching Assistants are covered by Union Contract
 - Bi-weekly stipend: \$1241
 - Tuition waiver and healthcare are automatically covered and taxes withheld
- Research Assistantships (RA)
 - Official MSU Appointments (employment) – Most students become RAs after 1-2 years
 - Bi-weekly stipend: \$1241
 - Tuition waiver and healthcare are automatically covered and taxes withheld
- Fellowships – characteristics depend on fellowship
 - Can be an Assistantship (see above) or Separate non-employment payment
 - In the latter case:
 - Usually lump-sum payment per semester – withhold funds to pay taxes
 - Usually provided with funds to pay for tuition and health insurance, but must pay/enroll
- Combination of stipend and healthcare meets it meets the definition of a living wage for a single person in East Lansing

Physics Research Areas in the Department – Opportunities for Interdisciplinary Research

- High Energy Physics
 - Condensed Matter Physics and Quantum Information Science
 - Nuclear (Astro) Physics
 - Accelerator Science
 - Physics Education Research
 - Bio Physics
- } Facility for Rare Isotope Beams
-
- Computational Science, Mathematics and Engineering (Certificates and Dual Major)

Graduate Program Website



- Information about a wide variety of topics (housing, campus life, activities)
- MSU has on-campus housing, but most graduate students live off campus
- Newest apartment buildings near campus – probably a bit more expensive
- Some students live in Lansing, rather than East Lansing
- Quite a few PA students share apartments/rental housing
- **Please ask our Graduate Students!**

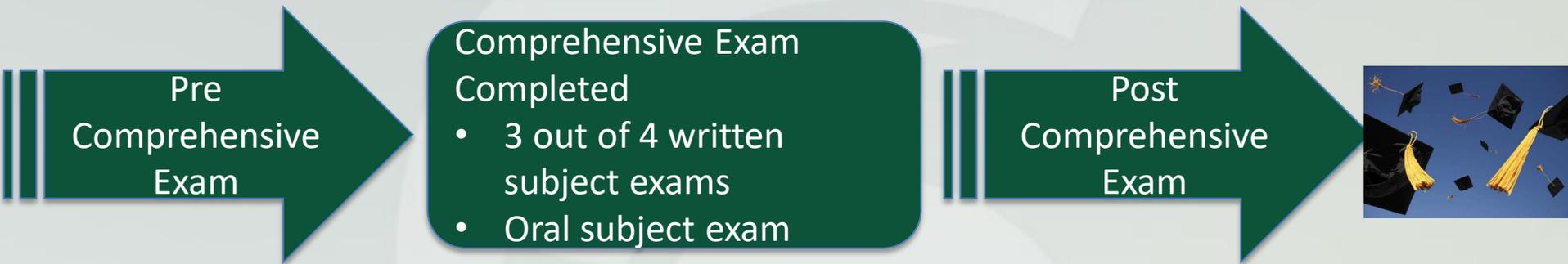
Recent changes in Support of Students With a Wide Variety of Backgrounds and Different Learning and Assessment Strength

- Enhanced mentoring structures during initial stages of graduate program
 - Mentoring committee
 - Regular meetings with graduate program director
 - **Shared expectations between students and advisors**
- **Individualized support for planning** of path through the program, starting during orientation
 - Transcript
 - Survey
 - Conversation with mentoring committee
- Enhanced support for course work – **exam help desk; summer tutorials**
- Path towards candidacy (completion of comprehensive exam) provides more flexibility and **supports healthy work-life balance**
- The core graduate courses have become more interactive and **assessment less focused on high-stakes exams**
- More emphasis on **learning through research** and less emphasis on learning through formal course work
- Changes were prepared in **close collaboration between faculty and graduate students**

Graduate Student Mentoring

- The students in our program come from a very wide variety of backgrounds and with diverse experiences
- We want you to thrive no matter the path that brought you here, or where you'll go in the future
- Mentoring is provided on an individualized basis – it is important what the best path is for you, not how you compare to others – **graduate school is not a competition**
- The first thing we do (during orientation) is to have a dialogue about what the path through our program (initially) looks like for you
- Frequent follow-ups (mentoring team)
- We advise that some students take a senior undergraduate course – we try to make the best assessment of what it takes for students to succeed
- Attrition rate is ~20% - much less than the national average of ~35%; students who decide to leave almost always do with a MS degree
- Time to degree ~5.5 years – about a year faster than the average for Physics in the US

Mentoring for Graduate Students



Pre
Comprehensive
Exam

Comprehensive Exam
Completed

- 3 out of 4 written subject exams
- Oral subject exam

Post
Comprehensive
Exam



Focused on Course Work and Research, in combination with Teaching

Initial Mentoring Committee:

- Graduate Program Director
- Initial Advisor (shared expectation form)
- Research Area Mentor
- Advising starts During Orientation
- GPD will schedule individual meetings at the end of Fall and Spring Semester
- Graduate Program Coordinator

Primarily Focused on Research

Guidance Committee

- Research Advisor (Chair of the Committee)
- 4 other faculty members (with some guidelines and rules)

Other Support

- Graduate Program Director
- Graduate Program Coordinator
- Research Area Mentor
- Peer Mentoring
- Mentoring Network

Program Structure in First 2 Years

Subject Exam courses

- 820 – Classical Mechanics
- 831 – Statistical Mechanics
- 841 – Classical Electrodynamics I
- 851 – Quantum Mechanics I

Comprehensive exam (getting to Ph.D. candidacy)

Written Subject exam courses

- Need to pass 3 out of 4 with 3.0 grade
- **Subject exam score is the higher of final exam and course grade**
- You might be asked to take all 4, but only 3 count towards comprehensive exam requirement

Oral Subject Exam

- Research Presentation

- Research presentation after ~2 years into the program
- Need to pass with a 3.5 or 4.0 grade

Other core courses

- 810 – Mathematical Methods
- 842 – Classical Electrodynamics II
- 851 – Quantum Mechanics II

Other core courses

- 810 may be waived depending on previous coursework
- Most student will take 852
- 842 is taken by many student in condensed matter physics and some other students – you might be ask to take it

Initial Research Courses

- 800 – Research Course (take 2x)
- 899 – MS Thesis Research
- 999 – Ph.D. Thesis Research

Take 800 2x for early stage research activities. Combined with 24 other credits (30 in total): get MS degree along the way to Ph.D (no MS thesis). 899: only if MS degree with thesis; 999: Take after PHY800 2x

Other Course Work

Survey Courses, Elective Courses, etc.

Graduate Program Options

- Dual Majors:
 - Dual Ph.D. major in Physics/Astronomy and Computational Mathematics Science and Engineering
 - Dual Ph.D. major in Physics and Quantitative Biology
 - Dual Ph.D. major in Physics and Mathematics
 - Some students pursue a Dual Major with Engineering Departments
- Graduate Certificates (typically 3 advanced courses)
 - Computational Mathematics Science and Engineering
 - High Energy Physics Instrumentation (High Energy and Nuclear Physics)
 - Accelerator Science & Engineering
 - College Teaching
- Future Academic Scholars in Teaching (FAST) Fellowships
- MS Degree in Accelerator Science & Engineering



Selecting a Research Advisor & Group

- Considerations
 - Research topic: must be exciting! You will spend ~4-5 years working on it
 - Research work: hands-on, theory, computational, mix, “own” setup
 - Research group: small, large, how much independence?
 - Research advisor: work and interaction style good match?
 - Long-term career goals: academia, industry, national lab, govt...?
 - Work-life balance: night shifts, travel, etc...
- How to choose?
 - Talk to potential advisors
 - Do online research
 - Attend seminars, colloquia
 - Do research projects to try things out (PHY800, summer research)
 - Talk to fellow students and others in the department
 - Talk to Grad Director & other mentors
- MSU PA has such a wide variety of choices that it is relatively easy to find a good match for almost any set of preferences
- Students do switch groups or try something out first

Graduate Student Support

- Support for Students with Disabilities (Course Work and Research) is coordinated through the [Resource Center for Persons with Disabilities \(RCPD\)](#) and MSU Human Resources
- Support for Graduate Student Wellness
 - University, Graduate School, and College Wellness Support
 - FRIB and Departmental Wellness Support: Local Wellness Coaches
- (Emergency) Financial Support
 - Resources available through MSU, Graduate School, College, Department and FRIB
- Career Support
 - Workshops, training, and individualized support through Graduate School
 - Departmental Career Events, contacts with Alumni
- Internships have become more popular during Graduate School
 - Companies
 - National Laboratories

Our Department Emphasizes Diversity, Equity, Inclusion, and Belonging (DEIB) – We Aim to Learn

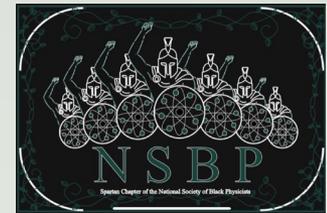
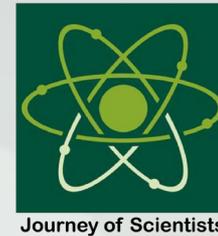
- Holistic approach to recruiting: <https://physics.aps.org/articles/v15/s166> (thesis of graduate student Nick Young)
- Resources in support of wellness – local Wellness Coach
- PA has its own DEI Committee with strong student involvement
- PA participates in the American Physics Society Inclusion, Diversity, and Equity Alliance (APS-IDEA)
- PA updated its Code of Conduct in 2020 to make it more meaningful and impactful
- Women and Minorities in Physical Sciences Student Organization (WaMPS) and Spartan Chapter of the National Society of Black Physicists (NSBP) play important roles in the Department – see later
- Changes to graduate program motivated by the desire to improve DEIB
- Faculty points of contact with shared experiences and backgrounds

Graduate Student Organizations

- Graduate Student Organizations play a very important role in the Department
- Departmental Organizations receive financial support from PA and FRIB for activities
- Participation in activities enhances your time in the program and is highly encouraged
- Participation and leadership in student organization is an excellent way to gain professional development

Graduate Student Organizations

- Physics Graduate Organization
 - Representation of Graduate Students in the Department and Committees
 - Social Events, Student Seminars
- Women and Minorities in Physical Sciences
 - Peer Mentoring Program
 - Activities in Support of DEIB
 - Outreach and Social Events
 - Podcast series "[Journeys of Scientists](#)" by Bryan Stanley
- Spartan Chapter of the National Society of Black Physicists (NSBP)
 - Mentoring, tutoring, and outreach activities
 - Community engagement
 - Fostering inclusive and equitable community
- FRIB Graduate Organization
 - Represents graduate students in FRIB committees and activities
 - Social activities, community building
- MSU Graduate Student organizations
 - Council of Graduate Students (COGS)
 - Graduate Employees Union (represent Teaching Assistants)
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Questions?

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