* **Module 1: Introduction to the Quantum World**We use the phenomena of *spin* to introduce you to the strangeness of the quantum world, show you why quantum mechanics is stochastic (meaning results can occur randomly, but with predictable probabilities to occur), and describe how to predict the probabilities that quantum events will occur.  
  我们用*自旋* 现象向你介绍量子世界的奇异之处，向你展示为什么量子力学是随机的（意味着结果可以随机发生，但发生的概率是可预测的），并描述如何 预测量子事件发生的概率。
* **Module 2: Advanced Quantum Mechanics with Spins**  
  Here we already move to quite advanced material. We discover why quantum mechanics is a nonlocal theory, that it cannot be described by any hidden variables, and that the concept of complementarity governs when quantum interference occurs and when it does not. We also examine phenomena that seem to require faster than light messaging and quantum objects moving backwards in time; we find that neither is actually needed - one needs to think carefully to understand how this is so. We also are introduced to the first of our four quantum operator identities (the Leibniz identity).  
  在这里，我们已经转向相当先进的材料。我们发现了为什么量子力学是一种非局部理论，它不能用任何隐藏的变量来描述，并且互补性的概念决定了量子干涉何时发生，何时不发生。我们还研究了似乎需要比光信息更快的现象和量子物体在时间上向后移动;我们发现实际上两者都不需要——人们需要仔细思考才能理解这是怎么回事。我们还介绍了四个量子算子恒等式中的第一个（莱布尼茨恒等式）。
* **Module 3: The Quantum Mechanics of Light**We start our coverage of the quantum mechanics of light, which will be revisited many times in the class. Here, we describe what a quantum particle is and how we can determine the behavior of quantum particles in a range of different situations and experiments, including what we call the quantum mystery. This approach is based on Feynman's path integral methodology for quantum mechanics.  
  我们开始介绍光的量子力学，这将在课堂上多次重温。在这里，我们描述了什么是量子粒子，以及如何确定量子粒子在一系列不同情况和实验中的行为，包括我们所说的量子奥秘。这种方法基于费曼量子力学的路径积分方法。
* **Module 4: Advanced Quantum Ideas with Light**This material is plain out weird. We show you how you can see something without looking at it and we describe how photons enjoy themselves so much that if they have an opportunity to "pair up" they always will.  
  这种材料很奇怪。我们向您展示如何在不看东西的情况下看到某物，并描述光子如何如此享受自己，以至于如果它们有机会“配对”，它们总是会的。
* ****Module 5: Quantum Operators and Their Identities****In this module, we develop two more of the four fundamental operator identities that are the workhorses of quantum-mechanics calculation: the Hadamard lemma with the exponential re-ordering and braiding operator variants and the disentangling identity. In the process, we also learn about the canonical commutation relation, which underlies all of the subsequent quantum phenomena, and arises from the fact that atomic spectra have sharp lines.  
  在本模块中，我们开发了作为量子力学计算主力的四个基本算子恒等式中的另外两个：具有指数重排序和编织算子变体的 Hadamard 引理以及解缠恒等式。在这个过程中，我们还了解了典型换向关系，它是所有后续量子现象的基础，并且源于原子光谱具有锐线这一事实。
* ****Module 6: Quantum Mechanics of the Simple Harmonic Oscillator****We develop the description of another important quantum system: the harmonic oscillator. We see the fourth fundamental operator identity (Baker-Campbell-Hausdorff identity and its Weyl form). We also explore the Schrödinger factorization method and Dirac's abstract methodology.   
  我们开发了另一个重要量子系统的描述：谐振子。我们看到了第四个基本算子恒等式（Baker-Campbell-Hausdorff 恒等式及其 Weyl 形式）。我们还探讨了薛定谔分解方法和狄拉克的抽象方法。
* ****Module 7: Quantum Angular Momentum and Hydrogen****We develop the theory for describing rotations and angular momentum and the general Schrödinger factorization method. Then we apply this approach to three-dimensional central force problem, which allows us to describe hydrogen. You will learn how, by just measuring the color of light, we can determine the mass and the size of the proton! We also will show you how you can measure how electrons are distributed around the nucleus.  
  我们开发了描述旋转和角动量的理论以及一般薛定谔因式分解方法。然后我们将这种方法应用于三维中心力问题，这使我们能够描述氢气。您将了解如何通过测量光的颜色来确定质子的质量和大小！我们还将向您展示如何测量电子在原子核周围的分布情况。
* ****Module 8: Quantum Approximation Methods****Not every problem can be solved exactly; we show you some approximation methods that are used in quantum mechanics. This allows us to describe how radio astronomy works and how potentials can always trap particles in one and two dimensions, but not in  three.  
  并非每个问题都能准确解决;我们向您展示一些量子力学中使用的近似方法。这使我们能够描述射电天文学的工作原理，以及势势如何始终将粒子捕获在一维和二维中，而不是三维中。
* ****Module 9: Quantum Time Evolution****We describe the science behind magnetic resonance imaging (MRI), used in hospitals.  
  我们描述了医院使用的磁共振成像 （MRI） 背后的科学原理。
* ****Module 10: Photons and LIGO****No one should finish a quantum-mechanics class without knowing what a photon is. We describe how single photons are detected, what squeezed light is and how LIGO can measure distances small enough that it can detect gravitational waves.  
  任何人都不应该在不知道光子是什么的情况下完成量子力学课程。我们描述了如何检测单光子，什么是压缩光，以及 LIGO 如何测量足够小的距离以检测引力波。

Upon successfully completing this course, you will:

* Be able to describe how the principle of superposition underlies wave-particle duality and use the quantum superposition of states to analyze properties of spin (Stern-Gerlach experiments) and light (one-, two-, and multiple slits and the Mach-Zehnder interferometer).  
  能够描述叠加原理如何成为波粒二象性的基础，并使用态的量子叠加来分析自旋（Stern-Gerlach 实验）和光（一缝、二缝和多缝以及马赫-曾德干涉仪）的特性。
* Distinguish between events, alternative ways an event occurs, tagging, and measurement; be able to use the mathematical formalism of quantum mechanics to describe these different phenomena and how they allow for delayed choice experiments.  
  区分事件、事件发生的替代方式、标记和测量;能够使用量子力学的数学形式来描述这些不同的现象，以及它们如何允许延迟选择实验。
* Describe how entanglement requires quantum mechanics to violate local realism and how experiments verify that this occurs.  
  描述纠缠如何要求量子力学违反局部实在论，以及实验如何验证这种情况的发生。
* Explain how an interaction-free experiment allows for quantum seeing in the dark and the details of how such an experiment is carried out.  
  解释无交互实验如何允许在黑暗中进行量子观察，以及如何进行此类实验的细节。
* Know the four fundamental operator identities of quantum mechanics (Leibniz rule, Hadamard lemma, exponential disentangling identity, and Baker-Campbell-Hausdorff formula), in all of their variants, and be able to use them in quantum calculations.  
  了解量子力学的四个基本算子恒等式（莱布尼茨规则、哈达玛引理、指数解缠恒等式和贝克-坎贝尔-豪斯多夫公式），以及它们的所有变体，并能够在量子计算中使用它们。
* Use the Schrödinger factorization method to solve bound-state energy eigenvalue problems (determining the energies algebraically) and couple it with the translation operator (or the subsidiary condition) to find the wavefunctions; explain why the energy levels are discrete and describe how to use the node theorem to verify completeness.  
  使用薛定谔分解方法解决束缚态能量特征值问题（代数确定能量），并将其与平移算子（或次条件）耦合以找到波函数;解释为什么能级是离散的，并描述如何使用节点定理来验证完整性。
* Use quantum principles employed in the class to explain properties of hydrogen including how to use spectroscopy to measure its mass, the radius of the nucleus, how it is used in radio astronomy, and how the probability distribution of electrons are measured in momentum space.  
  使用课堂上采用的量子原理来解释氢的性质，包括如何使用光谱学测量其质量、原子核的半径、它在射电天文学中的应用以及如何在动量空间中测量电子的概率分布。
* Use approximation methods of perturbation theory and the variational method to learn about quantum systems that cannot be solved exactly.  
  使用微扰理论的近似方法和变分方法来学习无法精确求解的量子系统。
* Calculate how time evolution is employed to describe oscillatory motion of the simple harmonic oscillator and the rotational motion of a nuclear spin; be able to use the Trotter form of the time-ordered product.  
  计算如何利用时间演化来描述简谐振荡器的振荡运动和核自旋的旋转运动;能够使用时序乘积的 Trotter 形式。
* Quantize light, describe what a photon is, how single photons are measured, how to verify you have a single-photon light source, how to squeeze light, and how quantum properties of light are used in gravitational wave detection.  
  量化光，描述什么是光子，如何测量单光子，如何验证您是否拥有单光子光源，如何挤压光，以及如何在引力波检测中使用光的量子特性。

Week 1: Introduction to the quantum world (MODULE 1) This week covers the classical and quantum Stern-Gerlach experiment and probability

Week 2: Advanced quantum mechanics with spin (MODULE 2) This week covers complementarity, delayed choice experiments, Einstein-Podolsky-Rosen experiments, Bell experiments, and magnetic resonance imaging

Week 3: The quantum mechanics of light (MODULE 3) This week covers light---partial reflection, moving through one, two and multiple slits, the quantum mystery, mirrors, lenses, and normalization

Week 4: Advanced quantum mechanics of light (MODULE 4) This week covers polarization of light, the Mach-Zehnder interferometer, quantum seeing in the dark, the Hong-Ou-Mandel experiment, and indistinguishability

Week 5 and 6: Quantum operators and their identities (MODULE 5) These two weeks cover three of the four fundamental operator identities (Leibniz, Hadamard, and exponential disentangling) along with their variants. It also covers Pauli spin matrices, the canonical commutation relation and position and momentum eigenstates.

Week 7: Midterm 1

Week 8 and 9: Quantum mechanics of the simple harmonic oscillator (MODULE 6) These two weeks cover the free particle on a circle, introduction to the factorization method, Heisenberg’s uncertainty principle, Baker-Campbell-Hausdorff formula, simple harmonic oscillator wavefunction, coherent states, squeezed states, and applications

Week 10, 11, and 12: Quantum angular momentum and hydrogen (MODULE 7) These three weeks cover angular momentum operators, rotations, spherical harmonics, Schroedinger factorization method (general case), EPR, node theorem, time of flight, separation of variables, radial momentum, isotropic simple harmonic oscillator, hydrogen energy eigenvalues, wavefunctions (in position and momentum space), Pickering lines, discovery of deuterium, and e-2e spectroscopy

Week 13 and 15: Approximation methods (MODULE 8) These two weeks discuss nondegenerate first and second-order perturbation theory, Feynman-Hellmann theorem, hyperfine structure of hydrogen and radio astronomy, proton charge radius, particle in a box, variational principle, and the argument that attractive potentials in one and two dimensions always have bound states.

Week 14: Midterm II

Week 16: Time evolution (MODULE 9) This week examines the Trotter formula and the time-ordered product, the time-dependence of coherent states and cyclotron resonance, and discusses how we quantize light

Week 17: Photons and LIGO (MODULE 10) This week explains what a photon is, how we measure them, and how we can tell we have a single-photon source of light. It also discusses how the laser interferometry gravitational-wave observatory works.

Week 18 and 19: Final exam

****Problem Set 1****

1. [Eigenvalues and eigenvectors of a general Hermitian 2 x 2 matrix](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0328d164beac470aad236bf512e0e387)
2. [Completeness](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/230ef2d947354062ba184f8b709a2b0b)

****Problem Set 2****

1. [Equivalent states](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a4b10c9f51904ce28cfee2efd20f37e8)
2. [More spin eigenstates](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ac6a73a8c03a4d17913e09c028a6c90e)

****Problem Set 3****

1. [Quantum Key Distribution in the BB84 protocol](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0363ebe72afb480f85339332c2e84740)
2. [Eavesdropping](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e54c61b3f3304213b214be9466842d2e)

****Problem Set 4****

1. [Rabi Oscillations](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38e5f25900174f0fad3eac2867376f56)
2. [Probability and energy of bosons](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f71d84f5897042d2bc8c4be95f18dccc)

****Problem Set 5****

1. [Stern Gerlach](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e33494f3e95e4c68914d8d964680c45c)
2. [Exponentiation of Pauli Matrices](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e0b555fb94d946e5bfd0ec92b3ca5894)
3. [Working with Pauli identities](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/021edab17a704935b25ddc0dcbef6af7)
4. [Exponential disentangling](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a3881974d47e40569de7c5e445a056c9)
5. [Exponential disentangling for symplectic matrices](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cce124a1b2dd416e9eeb64e617e9d8fd)

****Problem Set 6****

1. [Commutator of momentum with an exponential](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/da4e130aefe041f88cc501abe0faae45)
2. [Braiding and exponential re-ordering](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/704906ab40c14f0e8e24f315ad164975)
3. [Hadamard for Pauli matrices](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8191171aa7bc44188d7fbd6be118457d)
4. [Gaussian wavepacket](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8d928e53f54b44d5825a708fa05f1638)
5. [The free particle](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7cba168195b6497082cd7a4e3e517553)

****Problem Set 7****

1. [Momentum states on a circle](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b3fb7783cde64d60ab33293cc6e3bd25)
2. [Position operator on a circle](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/52818f14e224491cacad08e0804c9ae8)
3. [Lennard-Jones potential](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/597eb811572943e7b42acd811a3e3ba4)
4. [Operators and the simple harmonic oscillator](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ee7677c9c104432a4a73854347ac1ab)
5. [Uncertainty](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/28ddf98d60f844eeb1d5f413629ac998)

****Problem Set 8****

1. [Application of Baker-Campbell Hausdorff formula to the simple harmonic oscillator](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9f2411c3e683429bbaa8dd90c276773b)
2. [Wavefunction in momentum space](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9a9525963e87444e90862014530a9c69)
3. [Coherent states](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/04e9a268abf24ff78b170aa0bcb3c85e)
4. [Squeezed states](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/db8d47fd92144b12908ee018247914da)
5. [Simple harmonic oscillator in 3D and the Deuteron](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4e1085b8720a477980eccdf09f6f95fd)

****Problem Set 9****

1. [Angular momentum uncertainty and hidden variables for Bell experiments](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a3255e90e70c4406be2ef6ff903f6441)
2. [Molecular rotation spectroscopy](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/46941092d81547c8ab0947f2f46f1d34)
3. [Orthogonality of spherical harmonics](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c0523c942ea24e059a5e0bad7c0c817b)
4. [Normalization of eigenstates in the factorization method](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5cc8ac0d439a4f8c81bf9aa2e53828e6)
5. [The subsidiary condition and wavefunctions](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/bc5b758cd4924feebf43c4dde51b4bca)

****Problem Set 10****

1. [Factorization chain for a circle](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e0196061923d4778b9aa65e428ab2751)
2. [The subsidiary condition and wavefunctions](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6c14bee8514b699ccf07d771c9e1db)
3. [The tanh^2 potential](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f143e1dada7d455aa7cb3f672ba28f03)
4. [Separation of variables in 2D](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/760add9aba4b47a5833c51083158c0cc)
5. [Morse potential](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/85e50051038444dea1e05d7329d63842)

****Problem Set 11****

1. [Normalization factor of the isotropic simple harmonic oscillator](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9ce6a0d8c28242a1be6a08b6165b8b04)
2. [Using factorization to find the energies of the 2D simple harmonic oscillator and Coulomb problems](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6e633642da4bf58a34335ae5608884)
3. [Testing the validity of Coulomb's law](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b055c70af9924bffb6845925948f3c23)
4. [The virial theorem and the size of atoms](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d1684a0885094ef9b16a77bb5534a366)
5. [Kramers-Pasternack relation for positive powers](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f6719e7f9ebf44b29e3ae7e38ac43cf1)

****Problem Set 12****

1. [Kramers-Pasternack II](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/52169bd428f64e6a8d46f7d5348eb971)
2. [Kramers-Pasternack for inverse moments 3,4,5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9947fdf023fb4d4e887ff07331a0720e)
3. [Uncertainty and Hydrogen](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3d6bc006317a4e4daa31d80106252220)
4. [Hydrogen in momentum space](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06a8d3da18164a81bf574a016b07a484)
5. [Hydrogen in momentum space II](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f33108f973064ecfaeed5dd55478aaba)

****Problem Set 13****

1. [Perturbation theory of the anharmonic simple harmonic oscillator](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/be6eb53ccf284913a29233411b130562)
2. [Muonic hydrogen](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ee581617c1fb49b696b7b1590a0c830f)
3. [Landau-Zener problem](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fed3ab2523004c889b4b397ed4c071bc)
4. [Particle in a 2D circular box](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4c14f2f0260545c6ae904c78f0951f7a)
5. [Time dependence of squeezed states](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec2eac49640c4b3aae9911a673de4630)

Abelian group [Mod 5, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ce123829238b4446b49bc7b3bc56ef55)

Angular momentum [Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369), [Mod 7, p12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b6e338d7608c43b798ffdebe2aa022c6)

Angular momentum commutation relations [Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

Angular momentum eigenstates [Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

Angular momentum lowering operator [Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

Angular momentum raising operator [Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

Angular momentum, total squared [Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

Anharmonic oscillator [Mod 9, p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/be6eb53ccf284913a29233411b130562)

Baker Campbell Hausdorff identity [Mod 6, p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5c6c47369be74e9ba158e1b1bff647ff)

BCH identity, Weyl form[Mod 6, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b7), [Mod 6, p36](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b7)

Balmer series [Mod 7, p44](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d97746bddc9749f3b4b11858be796fb7)

Beam splitter [Mod 4, p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/277641e7721a4c2b8abc18c7703eb22a)

Bell's experiment[Mod 2, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f9c3e9dcc5e243328ab49cfb893ec682)

Bell's inequality [Mod 7, p 14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/bba344e8d19648da91a9afb29e08ec95), [Mod 7, p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a3255e90e70c4406be2ef6ff903f6441)

Binomial coefficient [Mod 4, p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/184dbecb90a145b1b8f847989f360840)

Binomial theorem [Mod 4, p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/184dbecb90a145b1b8f847989f360840)

Bosons [Mod 4, p25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06d304136bba48f0b0765fd72c2d89e3), [Mod 4, p29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8cfa6aae6f774e8fb35234f481986a2d), [Mod 4, p33](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f71d84f5897042d2bc8c4be95f18dccc)

Boson states, counting [Mod 4, p 30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/df2aa2804a1347509a828846573a3413), [Mod 4, p32](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4672799b1a554cf9a06a6412ade2db44)

Bound states [Mod 8, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5a64b4b26255462d921e46a952b03627), [Mod 8, p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f76c9e7d0f3d485184447b43f72ac00e), [Mod 8, p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/71c9530289324cca8fc097a845f08dc3), [Mod 8, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/446e2afb1bec4a3686fbfc6204f659c9), [Mod 8, p23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ebb91d7f4f543e5a7133609e2901793)

Braiding Identity [Mod 5, p28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/704906ab40c14f0e8e24f315ad164975)

Canonical commutation relation [Mod 5, p17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e7dfc01e6fdc4bf4b0cfaf072661bf91), [Mod 5, p18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3f370ed711114e13aaed1693f24c8534)

Change of basis[Mod 1, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7ce9fc0d0fa04abdac96c8f8ee598f0f)

Coherent state [Mod 6, p27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cf577109ce4643f89ea669652d74d05a), [Mod 6, p38](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/04e9a268abf24ff78b170aa0bcb3c85e), [Mod 9, p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ed6672655e240feae1fdac534fbd6ff)

Collapse theory [Mod 2, p34](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/764cf8e30601490b8d2537d7e3a69df9)

Commutator [Mod 2, p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cd38009e419440f984eeaa34490671a8)

Commutator of powers of position and momentum [Mod 5, p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/98b68287f81245c6b8920a6509282342), [Mod 5, p27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/da4e130aefe041f88cc501abe0faae45)

Complementarity [Mod 2, p10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4fb128b5d7414c8f9f7cdb0724ac3c94)

Completeness [Mod 1, p27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/230ef2d947354062ba184f8b709a2b0b)

Complex numbers [Mod 3, p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/17a00a75aa7c45608cc407fef91d8991)

Compound probability amplitudes [Mod 4, p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/df51351937a94849aebb9aa166df1bf1)

Copenhagen interpretation [Mod 7, p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c2ebe0a360d04129b6c67eaf02ba437f)

Coulomb problem Mod 7, p43

Coulomb wavefunctions [Mod 7, p47](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/444daadf6bb34702ae50d52172a0e1bc), [Mod 7, p48](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2a8ff35d3f0e4d64b33d7fcaa5527cfa), [Mod 7, p49](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e6880cbee6b84020b6a2f69ce6f401cb)

Current loops [Mod 1, p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1f22e32d9a7340c38fb9234e8f5d177f)

Cyclotron [Mod 9, p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/dced1ec9aab5423eb0d65526af418fad)

Dark count [Mod 4, p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fe53e674dbc74ac3a7e969ff294fc279)

DeBroglie wavelengths [Mod 5, p25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ba4ac300d9384361b10f1e0ef2ae1379)

Degeneracy [Mod 6, p40](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4e1085b8720a477980eccdf09f6f95fd)

Delayed choice [Mod 2, p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/57dfcf012acd4b8d83cc31c9dbf821b1), [Mod 2, p23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/79dd2211d6db426ca4ca5ac894d54889), [Mod p25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e15466db77c8415f8fe693313813e5fe)

Deuterium [Mod 7, p45](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cb413b2d4ee4484b9d44f755ebbecefc), [Mod 7, p46](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/07e03fee32a74c9e9ab559c6444d091d)

Deuteron [Mod 6, p34](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ac78af60faf54e18bba8461846bd726e)

Diffraction

Diffraction, double slit [Mod 3, p16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f2bd17299e684a55ac9c3a2e3993cdc9), [Mod 3, p17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e1005141fda44fb8a92986979b0f7017)

Diffraction, single slit [Mod 3, p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6c9208c8532544b59672f7aa63259521), [Mod 3, p17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e1005141fda44fb8a92986979b0f7017)

Diffraction grating[Mod 3, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d8107e2772c546299a289d708c6c6d91)

Dirac notation [Mod 1, p18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0a51e3c1adbd4385a18a0fcffbc0170e), [Mod 1, p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f9a97a47f06b46699fb3a58aa12bac38), [Mod 1, p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/bc3a530ee71040de86f272f520b9acff), [Mod 1, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7ce9fc0d0fa04abdac96c8f8ee598f0f)

Double slit experiment [Mod 3, p13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92366face8ce4676bdcbd415240928bb), [Mod 3, p18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/419dec5ecf524cbd85e00a9feba10b92), [Mod 3, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f6cc8531943f473da0bbe39af85a678f)

Eigenvalue [Mod 1, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f37d9f9da9844f9da1c296851713e7e7), [Mod 1, p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0328d164beac470aad236bf512e0e387)

Eigenvector [Mod 1, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f37d9f9da9844f9da1c296851713e7e7), [Mod 1, p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0328d164beac470aad236bf512e0e387)

Electron momentum spectroscopy [Mod 7, p58](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/727fcbc7f0654f88873fe31ce7ac6170), [Mod 7, p59](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a10152556a22461e81566c7abea2b3f6), [Mod 7, p60](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6cda48e77cca4f7ebca05872adcfd1c7)

Entanglement [Mod 2, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0bfd7ca17fac48b28537ed9672fe7c41), [Mod 2, p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b0b3a034d7264ab59899eb71700b80c2)

Einstein Podolsky Rosen experiment [Mod 7, p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c2ebe0a360d04129b6c67eaf02ba437f)

EPR paradox [Mod 2, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0bfd7ca17fac48b28537ed9672fe7c41), [Mod 2, p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/57dfcf012acd4b8d83cc31c9dbf821b1)

Exponential disentangling [Mod 5, p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1581a55a2c014635adb7198afb587cb2), [Mod 5, p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6fc4593eb42441628542a2f758470ce6), [Mod 5, p14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a3881974d47e40569de7c5e445a056c9), [Mod 5, p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cce124a1b2dd416e9eeb64e617e9d8fd), [Mod 6, p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f0d84a6e12614503a5dfc75e9d8e1d30) [Mod. 7, p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3aa481abc20a4bd193f92ce7d5f0ea19)

Factorization [Mod 6, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/354edbefd8a14d059a568a22fba73edb),[Mod 6, p4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ba281a817a44712bc2f43dbdf4ce47f), [Mod 7, p53](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6e633642da4bf58a34335ae5608884)

Factorization chain, circle [Mod 7, p33](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e0196061923d4778b9aa65e428ab2751)

Factorization chains [Mod 7, p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7)

Factorization, Cartesian hydrogen [Mod 7, p57](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2e71a962ec05420dad045f4fd109fa7a)

Fermions [Mod 4, p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/df2aa2804a1347509a828846573a3413)

Feynman-Hellmann theorem [Mod 8, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/49853a9716914fc5a8128c2126ece8d4)

Fluctuations [Mod 5, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e4ca12fb7cc4b1cbc8f9441ab10c99f)

Free particle[Mod 5, p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/371c0ec2e2234b4cb55f257da7e43096)

Free particle, 3D [Mod 5, p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7cba168195b6497082cd7a4e3e517553)

Gaussian integral [Mod 5, p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8d928e53f54b44d5825a708fa05f1638)

Gaussian wavepacket [Mod 5, p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8d928e53f54b44d5825a708fa05f1638)

Hadamard identity [Mod 6, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b8)

Hadamard lemma [Mod 5, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3941893af52446e992c83c6107fa9cbd)

Hadamard lemma, special case [Mod 5, p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e83e75302bf24cb5b08dd37a7a69ec29)

Hamiltonian [Mod 6, p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/248771ba228e4600af3545ce10ad0bda)

Hamiltonian of a free particle [Mod 5, p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/371c0ec2e2234b4cb55f257da7e43096)

Hamiltonian operator [Mod 6, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b4)

Harmonic Oscillator (see Simple Harmonic Oscillator)

Hermitian conjugate [Mod 1, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f37d9f9da9844f9da1c296851713e7e7)

Hermitian matrix [Mod 1, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f37d9f9da9844f9da1c296851713e7e7)

Heterodyne [Mod 10, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8c12b555fa704729b102b54f372cf8fe), [Mod 10, p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a46e05b0f17944bfa63e7ca37a7a9b79)

Hidden variables [Mod 2, p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/05a8718dc13e4502a67d7b2e6c355895), [Mod 2, p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6481424f2aaf4fb3b2a211476ee2a06e)

Homodyne [Mod 10, p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5f3573cb1a2c4a0bbca34a8443696059), [Mod 10, p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a46e05b0f17944bfa63e7ca37a7a9b79)

Hong-Ou-Mandel experiment [Mod 4, p27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/208f593125f4460a8232153bcff0807f)

Hydrogen [Mod 7, p43](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3c6563cb01946a3a8866851c261308f), [Mod 7, p44](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d97746bddc9749f3b4b11858be796fb7), [Mod 7, p47](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/444daadf6bb34702ae50d52172a0e1bc), [Mod 8, p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ed406e27acd94fed95663223fb40cd99), [Mod 8, p4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b55024d6b18d4f56888444bf8e9e0e57), [Mod 8, p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/aded8fff37024804a1c31030a90fa0f7), [Mod 8, p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3d6bc006317a4e4daa31d80106252220), [Mod 8, p10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06a8d3da18164a81bf574a016b07a484), [Mod 8, p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f33108f973064ecfaeed5dd55478aaba)

Hydrogen, degeneracy [Mod 7, p43](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3c6563cb01946a3a8866851c261308f)

Hydrogen, energy eigenstates [Mod 7, p43](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3c6563cb01946a3a8866851c261308f)

Hydrogen, factorization [Mod 7, p43](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3c6563cb01946a3a8866851c261308f)

Muonic hydrogen [Mod 9, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ee581617c1fb49b696b7b1590a0c830f)

Hyperfine structure [Mod 8, p2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b048652809a946c0b1b45772f51d0695), [Mod 8, p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ed406e27acd94fed95663223fb40cd99), [Mod 8, p4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b55024d6b18d4f56888444bf8e9e0e57), [Mod 8, p5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6a9f512889db4f67a9c05b1040519e7f)

Imperfect detectors [Mod 3, p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/01380cdfa71e49d186b4ba5631ab698a)

Interaction free measurement [Mod 4, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f52abb7ed6aa4cb1b8c041cdc098c0d1),[Mod 4, p2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5f01405a595d4e31b46f357c5796c90e), [Mod 4, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ecec2617e274f499f96bfb31adcb381)

Interaction free measurement, efficiency [Mod 4, p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fe53e674dbc74ac3a7e969ff294fc279)

Intertwining [Mod 7, p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7)

Kramers Pasternack relation [Mod 7, p56](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f6719e7f9ebf44b29e3ae7e38ac43cf1), [Mod 8, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/52169bd428f64e6a8d46f7d5348eb971), [Mod 8, p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9947fdf023fb4d4e887ff07331a0720e)

Laguerre polynomials [Mod 7, p41](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/85806cb7903b4f82b2632784f9571fa5), [Mod 7, p47](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/444daadf6bb34702ae50d52172a0e1bc)

Landau-Zener problem  [Mod 9, p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%20fed3ab2523004c889b4b397ed4c071bc)

Leibniz rule identity [Mod 2, p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/faeea1632f204b7da314b803fa4e4a87)

Lennard Jones Potential [Mod 6, p17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/597eb811572943e7b42acd811a3e3ba4)

Lenses [Mod 3, p23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e8e8fc88471446f1acff6a673e060d02)

Lie algebra [Mod 5, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ce123829238b4446b49bc7b3bc56ef55)

Lie group, non-abelian [Mod 7, p2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5a8fc5552a124c239ebe588e227bf189)

Lie groups [Mod 5, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ce123829238b4446b49bc7b3bc56ef55)

Light, transmission through glass [Mod 3, p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/804cc07dd24c45e69910991a7df28ca4)

LIGO [Mod 10, p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/719761c05c684c7c9f5a856391477d5a), [Mod 10, p12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d543fa50830c4a6698b2dd509b9d3709), [Mod 10, 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06078e25d9ac42a0a97c3383114f35b1), [Mod 10, p14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4a3eb93e9dec46c08b097275c141bf51)

Local realism [Mod 2, p32](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8df9da8d4c8f44bd84fb939134d6a70c)

Local realism, theory [Mod 2, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8df9da8d4c8f44bd84fb939134d6a70c),[Mod 2, p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e8d71d71c28148f790dc9dcc23fe253e), [Mod 2, p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6481424f2aaf4fb3b2a211476ee2a06e)

Lowering operator [Mod 6, p14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f841cf7667614f8b91443f353e98d4b2), [Mod 6, p18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ee7677c9c104432a4a73854347ac1ab), [Mod 6, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b3), [Mod 6, p29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a6a083767d304b1e9a98f3bc10092fdc)

Mach-Zehnder interferometer [Mod 4, p4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1f2596efcc5c4dd3ad843e5ee176a1dd), [Mod 4, p5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/47e2e7f7ba1d420cbef8de418a1f319b), [Mod 4, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ecec2617e274f499f96bfb31adcb381), [Mod 10, p10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0172abbbcf814643aba1b98415423703)

Mach-Zehnder interferometer, applications [Mod 4, p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/dc54e218aac249a898d7b70e487014d0)

Mach-Zehnder interferometer, Dirac approach [Mod 4, p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7c65e5da427f4095a2cb4e8556429fa4)

Magnetic field [Mod 1, p4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ea0491ae2c7449a09284f95a25cee73d), [Mod 1, p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a29db45ef9304143b11be38746fea898)

Magnetic needles [Mod 1, p5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d112f231826f4f04bc2517a0834b69a8)

Many worlds interpretation  [Mod 2, p34](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/764cf8e30601490b8d2537d7e3a69df9)

Many-body physics [Mod 4, p28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5f801c27a34e4b0cb99aa3df7d046273)

Maxwell's equations [Mod 9, p12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/262e1e8fa6ad49629368ef7dc9af7b43), [Mod 9, p13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9882944253a84e2ea1577fb180b83a26)

Michelson-Morley interferometer [Mod 10, p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/719761c05c684c7c9f5a856391477d5a)

Michelson-Morley experiment [Mod 4, p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/dc54e218aac249a898d7b70e487014d0)

Molecular rotation spectroscopy [Mod 7, p16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/46941092d81547c8ab0947f2f46f1d34)

Moment of inertia [Mod 7, p16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/46941092d81547c8ab0947f2f46f1d34)

Momentum

Momentum, eigenstate [Mod 5, p23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a075c99ec62b40b7a14660f166173d8a), [Mod 6, p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b3fb7783cde64d60ab33293cc6e3bd25)

Momentum, operator [Mod 6, p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b3fb7783cde64d60ab33293cc6e3bd25), [Mod 6, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b6)

Morse potential [Mod 6, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fd5322c7b1344ed781ed2f3d06830977), [Mod 6, p35](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2225d89ee17b43ef8d1abc6bb5e06471), [Mod 6, p40](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4e1085b8720a477980eccdf09f6f95fd), [Mod 7, p37](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/85e50051038444dea1e05d7329d63842)

MRI [Mod 2, p29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/841b448dc8004d32a6f736b94f264d8a)

Multiple reflections [Mod 3, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8ce6c5b171b94d6da8ea5b92cd4c188c)

NMR [Mod 2, p 27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8140c0ea36db49098d32d428ff3a022d), [Mod 2, p 28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f2a806aef63b49b3aeb8afc55e80fca3)

Node [Mod 6, p 12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9ddabd73bfa548cfbf70f89d8d7b4bf3)

Node theorem [Mod 7, p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7), [Mod 7, p 21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92d92a096902426dbf8876c37ecd67ca), [Mod 7, p 22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d034302b9d1d4f5d8bd0d3b3da216f03), [Mod 7, p 23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0947e649fb8c4cec81e8d586389a955b), [Mod 7, p 24](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a249f0a46b0f42e1b47d21cef6945fc5)

Normal ordering [Mod 6, p 18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ee7677c9c104432a4a73854347ac1ab)

Normalization [Mod 3, p 23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e8e8fc88471446f1acff6a673e060d02), [Mod 3, p 24](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f7d01c14a1d448088af70c9bc76455e4)

Partial reflection [Mod 3, p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/17ca5bf5b29f49f8a39ce285424f0c71), [Mod 3, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/672e7a66995a4138ab1f549b8ac487ec)

Particle bunching [Mod 4, p 25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06d304136bba48f0b0765fd72c2d89e3)

Pauli spin matrices [Mod 5, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d5bdb09673cf4285b8fcef4a321fb872), [Mod 5, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92150e11a0d24611866ac34bfa656509)

Pauli matrix identities [Mod 5, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b6d04009a69547548fc436a87e0787df)

Arbitrary matrices in terms of Pauli spin matrices [Mod 5, p 4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6282dc2f45af4ecca0bf6e5b8ec305e6)

Pauli spin matrices, eigenvalues [Mod 5, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92150e11a0d24611866ac34bfa656509)

Pauli spin matrices, triple product [Mod 5, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92150e11a0d24611866ac34bfa656509)

Perturbation theory [Mod 8, p 14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%205d43bfc742234f99931d14529d85cc74), [Mod 9, p 6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/be6eb53ccf284913a29233411b130562)

Perturbation theory, first order [Mod 8, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/49853a9716914fc5a8128c2126ece8d4)

Perturbation theory, second order [Mod 8, p 12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4cc43742895c419ead83eaf2284316b4)

Phase space [Mod 9, p 4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3ba56416ee08466a8aaced1372ca4e5b)

Photomultiplier tube [Mod 10, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/17d9b0a478c740e2a760e2123d25e046), [Mod 10, p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3fa44439a51f4b6798041712fe15c1f6)

Photon [Mod 10, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/639705b56cdf4452be85813b0ab6d1aa), [Mod 10, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/17d9b0a478c740e2a760e2123d25e046), [Mod 10, p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3fa44439a51f4b6798041712fe15c1f6), [Mod 10, p 4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/21ac47e2311046dd90a8fa818d04985b), [Mod 10, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b0f85020ad434d1ea80c506442c71240), [Mod 10, p 6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8fc2faec45f8498393b3dd32b2c427f4), [Mod 10, p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%200172abbbcf814643aba1b98415423703)

Photon self-reflection [Mod 3, p 22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d8107e2772c546299a289d708c6c6d91)

Pickering lines [Mod 7, p 44](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d97746bddc9749f3b4b11858be796fb7)

Pickering-Fowler hypothesis [Mod 7, p 44](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d97746bddc9749f3b4b11858be796fb7)

Pilot wave theory [Mod 2, p 34](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/764cf8e30601490b8d2537d7e3a69df9)

Polarization [Mod 4, p 12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/84a890f1db764d528aa86c9b3f78856b), [Mod 4, p 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38f7327b193247d59759017ac1f22a31)

Polarization rotator[Mod 4, p 17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d02d0eb9698a424ba6c63dfdf78d4e14)

Polarization in Dirac notation [Mod 4, p 16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59261d9f300a4e77ae5d342bdd228fcd), [Mod 4, p 18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0293707b42984475b272ed0f22cb8e91)

Polarized beam splitter, [Mod 4, p 19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fe125dd5607f45d9bdc8bb9e16d0dc3c)

Polarized interferometer, [Mod 4, p 19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fe125dd5607f45d9bdc8bb9e16d0dc3c)

Experiments with polarizers [Mod 4, p 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38f7327b193247d59759017ac1f22a31), [Mod 4, p 17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d02d0eb9698a424ba6c63dfdf78d4e14), [Mod 4, p 18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0293707b42984475b272ed0f22cb8e91)

Position eigenstate [Mod 5, p 23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a075c99ec62b40b7a14660f166173d8a)

Position operator [Mod 6, p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/770151b7b5784f1b9a1efe69b9e04819), [Mod 6, p 16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/52818f14e224491cacad08e0804c9ae8), [Mod 6, p 22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b5)

Position states in the theta-phi direction [Mod 7, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/657ffe4d315e434c96699944779ad2fd)

Probability [Mod 1, p 14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38c8ffb321e24e33a7a76c3b8589f709), [Mod 1, p 15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c6afef06a9ce415c972222484c3fc616), [Mod 1, p 16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e6c8dc7009d148caa6824c860791d7d2)

Probability of measurement [Mod 5, p 19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e4ca12fb7cc4b1cbc8f9441ab10c99f)

Projection operator [Mod 2, p 15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fde893880f4b47f09270ee7a7fc43147)

Proton charge radius [Mod 8, p 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/de43aa5afea7461db26e673811eafc3f)

Proton mass [Mod 7, p 45](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cb413b2d4ee4484b9d44f755ebbecefc)

Quantum camera [Mod 4, p 21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0e953014408149a2b124bb3f6000a226)

Quantum eraser [Mod 4, p 12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/84a890f1db764d528aa86c9b3f78856b)

Quantum key distribution [Mod 3, p 29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0363ebe72afb480f85339332c2e84740), [Mod 3, p 30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e54c61b3f3304213b214be9466842d2e)

Quantum mystery [Mod 3, p 19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f6cc8531943f473da0bbe39af85a678f), [Mod 3, p 21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/502e201858954814ae1b3d48d238b1c6)

Quantum numbers [Mod 7, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369), [Mod 7, p 12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b6e338d7608c43b798ffdebe2aa022c6), [Mod 7, p 51](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/eaa3177c30b84459bce137b9d3178b93)

Quantum rotations, general [Mod 7, p 4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e699644e5874bd1be948cf224efd49d), [Mod 7, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/657ffe4d315e434c96699944779ad2fd)

Quantum rules for light [Mod 3, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e79bf1bde2254d7aa62b930ee904a4ce)

Quantum seeing in the dark [Mod 2, p 17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/036b21a2e74249a88dd536ab4648d989), [Mod 4, p 7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ecec2617e274f499f96bfb31adcb381), [Mod 4, p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/390579cc2f144d5199a3e343df2bf0a9), [Mod 4, p 20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ceef0f0cb0484ce1b74484182110af7a)

Quantum Zeno effect [Mod 4, p 14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d369617ce7794a1a8e937179260aff8a)

Rabi oscillations [Mod 4, p 32](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38e5f25900174f0fad3eac2867376f56)

Radial momentum, [Mod 7, p 30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1c7e0feabfa24ab599dc53e8e59d0054), [Mod 7, p 31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/69e9880155c2464592fbb36ca33ad3c3), [Mod 8, p 9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3d6bc006317a4e4daa31d80106252220)

Radial translation [Mod 7, p 32](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/af4d7f35e1a9424ab42822ef73c80b8d)

Radio astronomy [Mod 8, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6a9f512889db4f67a9c05b1040519e7f)

Raising operator [Mod 6, p 14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f841cf7667614f8b91443f353e98d4b2), [Mod 6, p 18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ee7677c9c104432a4a73854347ac1ab), [Mod 6, p 22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b2), [Mod 6, p 29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a6a083767d304b1e9a98f3bc10092fdc)

Spin operators

 operator [Mod 2, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8c63ce88f40f439ba6c0fed670d09157)

 operator [Mod 2, p 7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b353bd69c9894f82a5685bb3619049f7)

 operator, eigenvalues and eigenvectors [Mod 2, p 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1da9e49a52af49319c9e19a622be2424)

operator (total spin) [Mod 2, p 9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/faeea1632f204b7da314b803fa4e4a87), [Mod 2, p 36](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ac6a73a8c03a4d17913e09c028a6c90e)

 operator (total spin), eigenvalues [Mod 2, p 36](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ac6a73a8c03a4d17913e09c028a6c90e)

Spin operator matrix, theta-phi direction [Mod 5, p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3246395620344d8852a13039b282b0f)

Schrodinger equation [Mod 8, p 18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6224c9ea1bdc417484af2450b5f4699d)

Schrodinger factorization method [Mod 7, p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7), [Mod 7, p 20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f174df015cb84972b0f599cea5632c87)

Separation fallacy [Mod 2, p 25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e15466db77c8415f8fe693313813e5fe)

Separation of variables

Separation of variables, kinetic energy [Mod 7, p 31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/69e9880155c2464592fbb36ca33ad3c3)

Separation of variables in 2 dimensions, [Mod 7, p 36](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/760add9aba4b47a5833c51083158c0cc)

Similarity transform [Mod 5, p 21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e83e75302bf24cb5b08dd37a7a69ec29)

Simple harmonic oscillator [Mod 6, p 7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fd5322c7b1344ed781ed2f3d06830977), [Mod 6, p 8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/248771ba228e4600af3545ce10ad0bda), [Mod 6, p 19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/28ddf98d60f844eeb1d5f413629ac998), [Mod 6, p 22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b1), [Mod 6, p 26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2e293d28eabe4c5b83e941a1ca6de771), [Mod 6, p 33](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4fcf396347504f2fa756e849b5a93c2a), [Mod 6, p 35](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2225d89ee17b43ef8d1abc6bb5e06471), [Mod 7, p 52](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6e633642da4bf58a34335ae5608884), [Mod 9, p 4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%203ba56416ee08466a8aaced1372ca4e5b)

Simple harmonic oscillator in 2 dimensions [Mod 7, p 53](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6e633642da4bf58a34335ae5608884)

Simple harmonic oscillator in 3 dimension [Mod 6, p 32](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e8f6905973b84dca850d47e367989167), [Mod 6, p 40](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4e1085b8720a477980eccdf09f6f95fd)

Simple harmonic oscillator, classical [Mod 9, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ae9a799570be43d387460d12b6eb1d44)

Simple harmonic oscillator, factorization [Mod 6, p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1bcc8c1487964ecf80bf41a4672a2886)

Simple harmonic oscillator, 3D isotropic [Mod 7, p 39](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4eaa4b5ea6804506a265230b8bf3821a)

Simple harmonic oscillator, 3D isotropic wavefunctions [Mod 7, p 40](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f7bab0091cf94cdeaa46877c00b16cb2), [Mod 7, p 42](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/18b2140c7bd244888da0053ad4324fd1)

Single slit experiment [Mod 3, p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/67b7b45faf86462c958b80927d03653a), [Mod 3, p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/73a217615d164213bd41a50d90485059), [Mod 3, p 12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/321033f7a1df4253b115e7b4f548804a), [Mod 3, p 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/a67779644d1d4577b778b98cddc614b3/92366face8ce4676bdcbd415240928bb)

Single photon source [Mod 4, p 8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/277641e7721a4c2b8abc18c7703eb22a)

Spherical harmonics [Mod 7, p 6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3aa481abc20a4bd193f92ce7d5f0ea19), [Mod 7, p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6be0bee54acb46bb9b29bd57efa0ed44), [Mod 7, p 50](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%20cdf6e5f1bddf4dcd99127055dad45a40)

Spherical harmonics, d-wave [Mod 7, p 9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/79521071544c49b1b9d601bc1ca8c243)

Spherical harmonics, orthogonality of [Mod 7, p 17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c0523c942ea24e059a5e0bad7c0c817b)

Spherical harmonics, p-wave [Mod 7, p 8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/146f1621b0e44d7099fa72bb630a9c56)

Spherical harmonics, s-wave [Mod 7, p 7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7528c9f002ee4ea1a1743ed282a172a8)

Spin states

Spin singlet state [Mod 7, p 12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b6e338d7608c43b798ffdebe2aa022c6)

Spin singlet state, arbitrary direction [Mod 7, p 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3ee7cd66d2714844ace1ec50a2368091)

Spin triplet state [Mod 7, p 12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b6e338d7608c43b798ffdebe2aa022c6)

Spooky action at a distance, [Mod 2, p 19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0bfd7ca17fac48b28537ed9672fe7c41), [Mod 2, p 32](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8df9da8d4c8f44bd84fb939134d6a70c)

Squeezed state [Mod 6, p 28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e1df1eabd2a4f0cb2c106cb46450902), [Mod 6, p 39](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/db8d47fd92144b12908ee018247914da), [Mod 9, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cac284452ff7480a93c6ccc17d3becee), [Mod 9, p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec2eac49640c4b3aae9911a673de4630), [Mod 10, p 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06078e25d9ac42a0a97c3383114f35b1)

Squeezing operator [Mod 6, p 28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e1df1eabd2a4f0cb2c106cb46450902), [Mod 6, p 29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a6a083767d304b1e9a98f3bc10092fdc), [Mod 6, p 31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/04d764f74d3d433daa4e3647f2a95094), [Mod 6, p 39](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/db8d47fd92144b12908ee018247914da)

Stern-Gerlach

Stern-Gerlach analyzer loop [Mod 2, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2d5f33861d4e466e8d81319f4fd583b2), [Mod 2, p 16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b25af39f3e634ed1a3ded88321383e7d)

Stern-Gerlach, classical [Mod 1, p 7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/84c4898e7a2b4a6388f9c0c6b514dbef)

Stern-Gerlach, rotating [Mod 1, p 23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/57ff6a6e7c724525a13ad779a8ad4fec)

SU(2) algebra [Mod 5, p 7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ce123829238b4446b49bc7b3bc56ef55)

Subsidiary condition [Mod 7, p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7), [Mod 7, p 19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/bc5b758cd4924feebf43c4dde51b4bca)

Superposition [Mod 2, p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4fb128b5d7414c8f9f7cdb0724ac3c94)

Superpotential [Mod 7, p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7)

Symplectic matrix [Mod 5, p 9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6fc4593eb42441628542a2f758470ce6)

Tensor product [Mod 1, p 27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/230ef2d947354062ba184f8b709a2b0b)

Tensor product, Dirac notation [Mod 2, p 24](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d4284cd01a324a3d9fa8c030c7ef8f9d)

Three-slit experiment, [Mod 3, p 21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/502e201858954814ae1b3d48d238b1c6)

Time dependence [Mod 9, p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ed6672655e240feae1fdac534fbd6ff), [Mod 9, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cac284452ff7480a93c6ccc17d3becee), [Mod 9, p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec2eac49640c4b3aae9911a673de4630)

Time evolution [Mod 9, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fc35b04a22414a0c8922dcc711942ca9)

Time of flight experiment [Mod 7, p 27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/89b518419f8a4cf585cd135d403cd477), [Mod 7, p 28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f95e8cec00b449b83116fc2a5eca244), [Mod 7, p 29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e39b79d4dc9b4e479d9592d0e00d7ea3)

Transcendental equation [Mod 9, p 9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4c14f2f0260545c6ae904c78f0951f7a)

Trotter formula [Mod 9, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fc35b04a22414a0c8922dcc711942ca9)

Two slit experiment

Two slit experiment, Dirac approach [Mod 3, p 27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d2502a5fdfdd487d800e0d4c0b5b134d), [Mod 3, p 28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e698ddaaa698419ca07415a05ede7402)

Two slit experiment with polarizers [Mod 4, p 22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d4b550dd35414cbf81e6564ced5be06a), [Mod 4, p 23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ef38d5049b634a548412c2918e8fe809), [Mod 4, p 24](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f247f6e88c934282966b1db107e21567)

Two-body problem, [Mod 7, p 25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/52f8b40287de49d19aac2dc78c471d54)

Uncertainty [Mod 7, p 28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f95e8cec00b449b83116fc2a5eca244), [Mod 7, p 29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e39b79d4dc9b4e479d9592d0e00d7ea3)

Uncertainty principle [Mod 6, p 6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3e527c5a07e04a9da4f8140a69ac2ff0), [Mod 6, p 19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/28ddf98d60f844eeb1d5f413629ac998), [Mod 8, p 9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3d6bc006317a4e4daa31d80106252220)

Variational principle [Mod 6, p 34](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ac78af60faf54e18bba8461846bd726e)

Vector operators [Mod 7, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369), [Mod 7, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5a8fc5552a124c239ebe588e227bf189)

Vector operators, rotations of [Mod 7, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5a8fc5552a124c239ebe588e227bf189), [Mod 7, p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d2f17a4260b54e8fa13824d63c5d0f5b)

Virial theorem [Mod 6, p 6,](https://courses.edx.org/jumptoid/3e527c5a07e04a9da4f8140a69ac2ff0)  [Mod 7, p 54](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d1684a0885094ef9b16a77bb5534a366)

Wave motion [Mod 3, p 26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/17a00a75aa7c45608cc407fef91d8991)

Wave-particle duality, [Mod 3, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/154e6d4934c74a89b27447272dfcde93), [Mod 3, p 4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ad0c9a7a2aee4da6b706169b24caab44%5D)

Wavefunction [Mod 3, p 25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/22093ebcae6d46a1a906d439415f03e7)

Wavefunction, momentum in position space [Mod 5, p 24](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/539038af033d45ebb594055a28594d21)

Wavefunction, position in momentum space [Mod 5, p 24](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/539038af033d45ebb594055a28594d21)

Wavefunction nodes, [Mod 7, p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7)

Waves, [Mod 3, p 14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/33c78b8c32004d33ab611a7f250ef2e0)

Wheeler's delayed choice experiment [Mod 2, p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/351ff9d38b7c49eeb43f3fdcbf2ac5af)

Zeno's paradox [Mod 4, p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9b1469f7242e4bada1f3d3c16a5647d7)

Zero fluctuation state [Mod 5, p 19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e4ca12fb7cc4b1cbc8f9441ab10c99f)

****问题集 1****

1. [一般](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0328d164beac470aad236bf512e0e387) Hermitian 2 x 2 矩阵的特征值和特征向量
2. [完整性](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/230ef2d947354062ba184f8b709a2b0b)

****问题集 2****

1. [等效状态](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a4b10c9f51904ce28cfee2efd20f37e8)
2. [更多自旋本征态](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ac6a73a8c03a4d17913e09c028a6c90e)

****问题集 3****

1. [BB84 协议中的量子密钥分发](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0363ebe72afb480f85339332c2e84740)
2. [窃听](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e54c61b3f3304213b214be9466842d2e)

****问题集 4****

1. [拉比振荡](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38e5f25900174f0fad3eac2867376f56)
2. [玻色子的概率和能量](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f71d84f5897042d2bc8c4be95f18dccc)

****问题集 5****

1. [斯特恩·格拉赫](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e33494f3e95e4c68914d8d964680c45c)
2. [泡利矩阵的指数运算](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e0b555fb94d946e5bfd0ec92b3ca5894)
3. [使用泡利恒等式](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/021edab17a704935b25ddc0dcbef6af7)
4. [指数解开](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a3881974d47e40569de7c5e445a056c9)
5. [辛矩阵的指数解缠](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cce124a1b2dd416e9eeb64e617e9d8fd)

****问题集 6****

1. [具有指数的动量交换子](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/da4e130aefe041f88cc501abe0faae45)
2. [编织和指数重新排序](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/704906ab40c14f0e8e24f315ad164975)
3. [Hadamard 矩阵](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8191171aa7bc44188d7fbd6be118457d)
4. [高斯波包](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8d928e53f54b44d5825a708fa05f1638)
5. [自由粒子](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7cba168195b6497082cd7a4e3e517553)

****问题集 7****

1. [圆上的动量状态](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b3fb7783cde64d60ab33293cc6e3bd25)
2. [圆上的位置算子](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/52818f14e224491cacad08e0804c9ae8)
3. [Lennard-Jones势](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/597eb811572943e7b42acd811a3e3ba4)
4. [算符和简谐振子](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ee7677c9c104432a4a73854347ac1ab)
5. [不确定](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/28ddf98d60f844eeb1d5f413629ac998)

****问题集 8****

1. [Baker-Campbell Hausdorff公式在简谐振子中的应用](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9f2411c3e683429bbaa8dd90c276773b)
2. [动量空间中的波函数](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9a9525963e87444e90862014530a9c69)
3. [相干态](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/04e9a268abf24ff78b170aa0bcb3c85e)
4. [挤压态](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/db8d47fd92144b12908ee018247914da)
5. [三维简谐振子和氘核](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4e1085b8720a477980eccdf09f6f95fd)

****问题集 9****

1. [贝尔实验的角动量不确定性和隐藏变量](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a3255e90e70c4406be2ef6ff903f6441)
2. [分子旋转光谱](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/46941092d81547c8ab0947f2f46f1d34)
3. [球谐函数的正交性](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c0523c942ea24e059a5e0bad7c0c817b)
4. [因式分解法中的特征态归一化](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5cc8ac0d439a4f8c81bf9aa2e53828e6)
5. [辅助条件和波函数](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/bc5b758cd4924feebf43c4dde51b4bca)

****问题集 10****

1. [圆的因式分解链](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e0196061923d4778b9aa65e428ab2751)
2. [辅助条件和波函数](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6c14bee8514b699ccf07d771c9e1db)
3. [tanh^2势](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f143e1dada7d455aa7cb3f672ba28f03)
4. [二维变量分离](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/760add9aba4b47a5833c51083158c0cc)
5. [莫尔斯势](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/85e50051038444dea1e05d7329d63842)

****问题集 11****

1. [各向同性简谐振子的归一化因子](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9ce6a0d8c28242a1be6a08b6165b8b04)
2. [利用因式分解求二维简谐振子的能量和库仑问题](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6e633642da4bf58a34335ae5608884)
3. [检验库仑定律的有效性](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b055c70af9924bffb6845925948f3c23)
4. [维里定理和原子的大小](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d1684a0885094ef9b16a77bb5534a366)
5. [Kramers-Pasternack 正幂关系](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f6719e7f9ebf44b29e3ae7e38ac43cf1)

****问题集 12****

1. [克莱默斯-帕斯特纳克二世](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/52169bd428f64e6a8d46f7d5348eb971)
2. [Kramers-Pasternack 逆矩 3,4,5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9947fdf023fb4d4e887ff07331a0720e)
3. [不确定性和氢](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3d6bc006317a4e4daa31d80106252220)
4. [动量空间中的氢](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06a8d3da18164a81bf574a016b07a484)
5. [动量空间 II 中的氢](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f33108f973064ecfaeed5dd55478aaba)

****问题集 13****

1. [非谐振子的微扰理论](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/be6eb53ccf284913a29233411b130562)
2. [μ子氢](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ee581617c1fb49b696b7b1590a0c830f)
3. [朗道-齐纳问题](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fed3ab2523004c889b4b397ed4c071bc)
4. [二维圆形盒子中的粒子](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4c14f2f0260545c6ae904c78f0951f7a)
5. [压缩态的时间依赖性](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec2eac49640c4b3aae9911a673de4630)

阿贝尔群[Mod 5，p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ce123829238b4446b49bc7b3bc56ef55)

角动量[Mod 7，p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369) ， [Mod 7，p12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b6e338d7608c43b798ffdebe2aa022c6)

角动量对易关系[Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

角动量本征态[Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

角动量降低算符[Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

角动量提升算子[Mod 7, p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

角动量，总平方[模 7，p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369)

非谐振子[Mod 9，p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/be6eb53ccf284913a29233411b130562)

Baker Campbell 豪斯多夫恒等式[Mod 6，p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5c6c47369be74e9ba158e1b1bff647ff)

BCH身份，Weyl形式[Mod 6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b7)，第22页， [Mod 6，第36页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b7)

巴尔末系列[Mod 7，p44](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d97746bddc9749f3b4b11858be796fb7)

分束器[Mod 4，p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/277641e7721a4c2b8abc18c7703eb22a)

贝尔的实验[Mod 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f9c3e9dcc5e243328ab49cfb893ec682)，第22页

贝尔不等式[Mod 7，p14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/bba344e8d19648da91a9afb29e08ec95) ， [Mod 7，p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a3255e90e70c4406be2ef6ff903f6441)

二项式系数[Mod 4，p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/184dbecb90a145b1b8f847989f360840)

二项式定理[模 4，p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/184dbecb90a145b1b8f847989f360840)

玻色子[Mod 4，p25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06d304136bba48f0b0765fd72c2d89e3) ， [Mod 4，p29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8cfa6aae6f774e8fb35234f481986a2d) ， [Mod 4，p33](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f71d84f5897042d2bc8c4be95f18dccc)

玻色子态，计数[Mod 4，p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/df2aa2804a1347509a828846573a3413) ， [Mod 4，p32](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4672799b1a554cf9a06a6412ade2db44)

绑定状态[Mod 8, p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5a64b4b26255462d921e46a952b03627) 、 [Mod 8, p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f76c9e7d0f3d485184447b43f72ac00e) 、 [Mod 8, p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/71c9530289324cca8fc097a845f08dc3) 、 [Mod 8, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/446e2afb1bec4a3686fbfc6204f659c9) 、 [Mod 8, p23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ebb91d7f4f543e5a7133609e2901793)

编织身份[模型 5，p28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/704906ab40c14f0e8e24f315ad164975)

规范交换关系[Mod 5, p17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e7dfc01e6fdc4bf4b0cfaf072661bf91) , [Mod 5, p18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3f370ed711114e13aaed1693f24c8534)

基础变更[模式](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7ce9fc0d0fa04abdac96c8f8ee598f0f) 1，第 22 页

相干态[Mod 6，p27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cf577109ce4643f89ea669652d74d05a) ， [Mod 6，p38](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/04e9a268abf24ff78b170aa0bcb3c85e) ， [Mod 9，p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ed6672655e240feae1fdac534fbd6ff)

坍缩理论[模型 2，p34](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/764cf8e30601490b8d2537d7e3a69df9)

换向器[模型 2，p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cd38009e419440f984eeaa34490671a8)

位置和动量幂的交换子[Mod 5, p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/98b68287f81245c6b8920a6509282342) , [Mod 5, p27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/da4e130aefe041f88cc501abe0faae45)

互补[模型 2，p10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4fb128b5d7414c8f9f7cdb0724ac3c94)

完整性[模型 1，p27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/230ef2d947354062ba184f8b709a2b0b)

复数[模 3，p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/17a00a75aa7c45608cc407fef91d8991)

复合概率幅[Mod 4，p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/df51351937a94849aebb9aa166df1bf1)

哥本哈根诠释[Mod 7，第 26 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c2ebe0a360d04129b6c67eaf02ba437f)

库仑问题 Mod 7，p43

库仑波函数[Mod 7，p47](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/444daadf6bb34702ae50d52172a0e1bc) 、 [Mod 7，p48](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2a8ff35d3f0e4d64b33d7fcaa5527cfa) 、 [Mod 7，p49](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e6880cbee6b84020b6a2f69ce6f401cb)

电流环路[模块 1，p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1f22e32d9a7340c38fb9234e8f5d177f)

回旋加速器[Mod 9，第 11 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/dced1ec9aab5423eb0d65526af418fad)

黑暗计数[Mod 4，p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fe53e674dbc74ac3a7e969ff294fc279)

德布罗意波长[模型 5，p25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ba4ac300d9384361b10f1e0ef2ae1379)

退化[模式 6，p40](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4e1085b8720a477980eccdf09f6f95fd)

延迟选择[Mod 2，p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/57dfcf012acd4b8d83cc31c9dbf821b1) ， [Mod 2，p23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/79dd2211d6db426ca4ca5ac894d54889) ， [Mod p25](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e15466db77c8415f8fe693313813e5fe)

氘[Mod 7，p45](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cb413b2d4ee4484b9d44f755ebbecefc) ， [Mod 7，p46](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/07e03fee32a74c9e9ab559c6444d091d)

氘核[Mod 6，第 34 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ac78af60faf54e18bba8461846bd726e)

衍射

衍射，双缝[模 3，p16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f2bd17299e684a55ac9c3a2e3993cdc9) ，[模 3，p17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e1005141fda44fb8a92986979b0f7017)

衍射，单缝[Mod 3，p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6c9208c8532544b59672f7aa63259521) ， [Mod 3，p17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e1005141fda44fb8a92986979b0f7017)

衍射光栅[Mod 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d8107e2772c546299a289d708c6c6d91)，第22页

狄拉克符号[Mod 1，p18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0a51e3c1adbd4385a18a0fcffbc0170e) ， [Mod 1，p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f9a97a47f06b46699fb3a58aa12bac38) ， [Mod 1，p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/bc3a530ee71040de86f272f520b9acff) ， [Mod 1，p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7ce9fc0d0fa04abdac96c8f8ee598f0f)

双缝实验[Mod 3，p13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92366face8ce4676bdcbd415240928bb) ， [Mod 3，p18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/419dec5ecf524cbd85e00a9feba10b92) ， [Mod 3，p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f6cc8531943f473da0bbe39af85a678f)

特征值[模 1，p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f37d9f9da9844f9da1c296851713e7e7) ，[模 1，p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0328d164beac470aad236bf512e0e387)

特征向量[Mod 1，p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f37d9f9da9844f9da1c296851713e7e7) ， [Mod 1，p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0328d164beac470aad236bf512e0e387)

电子动量谱[Mod 7, p58](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/727fcbc7f0654f88873fe31ce7ac6170) , [Mod 7, p59](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a10152556a22461e81566c7abea2b3f6) ,[Mod 7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6cda48e77cca4f7ebca05872adcfd1c7)，第 60 页

纠缠[模型 2，p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0bfd7ca17fac48b28537ed9672fe7c41) ，[模型 2，p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b0b3a034d7264ab59899eb71700b80c2)

爱因斯坦·波多尔斯基·罗森实验[Mod 7，第 26 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c2ebe0a360d04129b6c67eaf02ba437f)

EPR 悖论[Mod 2，p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0bfd7ca17fac48b28537ed9672fe7c41) ， [Mod 2，p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/57dfcf012acd4b8d83cc31c9dbf821b1)

指数解缠[Mod 5，p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1581a55a2c014635adb7198afb587cb2) ， [Mod 5，p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6fc4593eb42441628542a2f758470ce6) ， [Mod 5，p14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a3881974d47e40569de7c5e445a056c9) ， [Mod 5，p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cce124a1b2dd416e9eeb64e617e9d8fd) ， [Mod 6，p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f0d84a6e12614503a5dfc75e9d8e1d30) [修改版 7，第 6 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3aa481abc20a4bd193f92ce7d5f0ea19)

因式分解[模 6，p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/354edbefd8a14d059a568a22fba73edb) ，[Mod 6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ba281a817a44712bc2f43dbdf4ce47f)，p4 ， [Mod 7，p53](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6e633642da4bf58a34335ae5608884)

因式分解链，圆[模 7，p33](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e0196061923d4778b9aa65e428ab2751)

因式分解链[Mod 7，p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7)

因式分解，笛卡尔氢[模 7，p57](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2e71a962ec05420dad045f4fd109fa7a)

费米子[模型 4，p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/df2aa2804a1347509a828846573a3413)

费曼-赫尔曼定理[Mod 8，p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/49853a9716914fc5a8128c2126ece8d4)

波动[模型 5，p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e4ca12fb7cc4b1cbc8f9441ab10c99f)

自由粒子[Mod 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/371c0ec2e2234b4cb55f257da7e43096)，第26页

自由粒子，3D [Mod 5，p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7cba168195b6497082cd7a4e3e517553)

高斯积分[模5，p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8d928e53f54b44d5825a708fa05f1638)

高斯波包[模型 5，p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8d928e53f54b44d5825a708fa05f1638)

Hadamard 恒等式[Mod 6，p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b8)

Hadamard 引理[Mod 5，p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3941893af52446e992c83c6107fa9cbd)

Hadamard 引理，特殊情况[Mod 5，p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e83e75302bf24cb5b08dd37a7a69ec29)

哈密顿量[Mod 6，p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/248771ba228e4600af3545ce10ad0bda)

自由粒子的哈密顿量[Mod 5，p26](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/371c0ec2e2234b4cb55f257da7e43096)

哈密顿算子[Mod 6，p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b4)

谐振子（参见简单谐振子）

厄米共轭[模 1，p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f37d9f9da9844f9da1c296851713e7e7)

埃尔米特矩阵[Mod 1，p19](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f37d9f9da9844f9da1c296851713e7e7)

异差式[Mod 10，p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8c12b555fa704729b102b54f372cf8fe) ， [Mod 10，p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a46e05b0f17944bfa63e7ca37a7a9b79)

隐藏变量[Mod 2，p21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/05a8718dc13e4502a67d7b2e6c355895) ， [Mod 2，p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6481424f2aaf4fb3b2a211476ee2a06e)

零差[Mod 10, p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5f3573cb1a2c4a0bbca34a8443696059) , [Mod 10, p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a46e05b0f17944bfa63e7ca37a7a9b79)

Hong-Ou-Mandel实验[Mod 4，p27](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/208f593125f4460a8232153bcff0807f)

氢[Mod 7, p43](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3c6563cb01946a3a8866851c261308f) , [Mod 7, p44](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d97746bddc9749f3b4b11858be796fb7) , [Mod 7, p47](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/444daadf6bb34702ae50d52172a0e1bc) , [Mod 8, p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ed406e27acd94fed95663223fb40cd99) , Mod [8, p4 , Mod](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b55024d6b18d4f56888444bf8e9e0e57) 8 [, p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/aded8fff37024804a1c31030a90fa0f7) , [Mod 8, p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3d6bc006317a4e4daa31d80106252220) , [Mod 8, p10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06a8d3da18164a81bf574a016b07a484) , [Mod 8, p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f33108f973064ecfaeed5dd55478aaba)

氢，简并[模型 7，p43](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3c6563cb01946a3a8866851c261308f)

氢，能量本征态[Mod 7，p43](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3c6563cb01946a3a8866851c261308f)

氢，因式分解[模 7，p43](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3c6563cb01946a3a8866851c261308f)

Muonic 氢[Mod 9，p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ee581617c1fb49b696b7b1590a0c830f)

超精细结构[Mod 8, p2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b048652809a946c0b1b45772f51d0695) , [Mod 8, p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ed406e27acd94fed95663223fb40cd99) , [Mod 8, p4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b55024d6b18d4f56888444bf8e9e0e57) , [Mod 8, p5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6a9f512889db4f67a9c05b1040519e7f)

不完美探测器[Mod 3，p20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/01380cdfa71e49d186b4ba5631ab698a)

无相互作用测量[模型 4，p1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f52abb7ed6aa4cb1b8c041cdc098c0d1) ，[模式](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5f01405a595d4e31b46f357c5796c90e) 4，p2 ，[模式 4，p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ecec2617e274f499f96bfb31adcb381)

无交互测量，效率[模型 4，p3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fe53e674dbc74ac3a7e969ff294fc279)

交织[模式 7，第 11 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7)

克莱默帕斯特纳克关系[Mod 7, p56](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f6719e7f9ebf44b29e3ae7e38ac43cf1) , [Mod 8, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/52169bd428f64e6a8d46f7d5348eb971) , [Mod 8, p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9947fdf023fb4d4e887ff07331a0720e)

拉盖尔多项式[Mod 7, p41](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/85806cb7903b4f82b2632784f9571fa5) , [Mod 7, p47](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/444daadf6bb34702ae50d52172a0e1bc)

Landau-Zener 问题[Mod 9，p8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%20fed3ab2523004c889b4b397ed4c071bc)

莱布尼茨规则恒等式[Mod 2，p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/faeea1632f204b7da314b803fa4e4a87)

Lennard Jones 势[模型 6，p17](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/597eb811572943e7b42acd811a3e3ba4)

镜头[模组 3，p23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e8e8fc88471446f1acff6a673e060d02)

李代数[Mod 5，p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ce123829238b4446b49bc7b3bc56ef55)

非阿贝尔李群[Mod 7，p2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5a8fc5552a124c239ebe588e227bf189)

李群[Mod 5，p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ce123829238b4446b49bc7b3bc56ef55)

光，透过玻璃[模型 3，p6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/804cc07dd24c45e69910991a7df28ca4)

LIGO[模组 10、p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/719761c05c684c7c9f5a856391477d5a) 、[模组 10、p12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d543fa50830c4a6698b2dd509b9d3709) 、[模组 10、13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06078e25d9ac42a0a97c3383114f35b1) 、[模组 10、p14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4a3eb93e9dec46c08b097275c141bf51)

局部现实主义[模型 2，p32](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8df9da8d4c8f44bd84fb939134d6a70c)

局部现实主义，理论[模型 2，p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8df9da8d4c8f44bd84fb939134d6a70c) ，[修改版](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e8d71d71c28148f790dc9dcc23fe253e) 2，第 30 页，[修改版 2，第 31 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6481424f2aaf4fb3b2a211476ee2a06e)

降低运算符[Mod 6, p14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f841cf7667614f8b91443f353e98d4b2) , [Mod 6, p18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ee7677c9c104432a4a73854347ac1ab) , [Mod 6, p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b3) , [Mod 6, p29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a6a083767d304b1e9a98f3bc10092fdc)

马赫-曾德尔干涉仪[Mod 4, p4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1f2596efcc5c4dd3ad843e5ee176a1dd) , [Mod 4, p5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/47e2e7f7ba1d420cbef8de418a1f319b) , [Mod 4, p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ecec2617e274f499f96bfb31adcb381) , [Mod 10, p10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0172abbbcf814643aba1b98415423703)

马赫-曾德干涉仪，应用[模型 4，第 6 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/dc54e218aac249a898d7b70e487014d0)

马赫-曾德干涉仪，狄拉克方法， [Mod 4，p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7c65e5da427f4095a2cb4e8556429fa4)

磁场[Mod 1，p4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ea0491ae2c7449a09284f95a25cee73d) ， [Mod 1，p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a29db45ef9304143b11be38746fea898)

磁针[模型 1，p5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d112f231826f4f04bc2517a0834b69a8)

多世界诠释[模型 2，第 34 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/764cf8e30601490b8d2537d7e3a69df9)

多体物理学[模型 4，p28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/5f801c27a34e4b0cb99aa3df7d046273)

麦克斯韦方程组[Mod 9，p12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/262e1e8fa6ad49629368ef7dc9af7b43) ， [Mod 9，p13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9882944253a84e2ea1577fb180b83a26)

迈克尔逊-莫雷干涉仪[Mod 10，p11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/719761c05c684c7c9f5a856391477d5a)

迈克尔逊-莫雷实验[模型 4，第 6 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/dc54e218aac249a898d7b70e487014d0)

分子旋转光谱法[Mod 7，p16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/46941092d81547c8ab0947f2f46f1d34)

转动惯量[Mod 7，p16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/46941092d81547c8ab0947f2f46f1d34)

势头

动量，本征态[Mod 5，p23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a075c99ec62b40b7a14660f166173d8a) ， [Mod 6，p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b3fb7783cde64d60ab33293cc6e3bd25)

动量，算子[Mod 6，p15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b3fb7783cde64d60ab33293cc6e3bd25) ， [Mod 6，p22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b6)

莫尔斯势[Mod 6，p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fd5322c7b1344ed781ed2f3d06830977) ， [Mod 6，p35](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2225d89ee17b43ef8d1abc6bb5e06471) ， [Mod 6，p40](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4e1085b8720a477980eccdf09f6f95fd) ， [Mod 7，p37](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/85e50051038444dea1e05d7329d63842)

MRI [Mod 2，第29页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/841b448dc8004d32a6f736b94f264d8a)

多次反射[模型 3，p7](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8ce6c5b171b94d6da8ea5b92cd4c188c)

NMR [Mod 2，第 27 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8140c0ea36db49098d32d428ff3a022d)， [Mod 2，第 28 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f2a806aef63b49b3aeb8afc55e80fca3)

Node [Mod 6，第 12 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/9ddabd73bfa548cfbf70f89d8d7b4bf3)

节点定理[Mod 7，p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7) ， [Mod 7，p 21](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92d92a096902426dbf8876c37ecd67ca) ， [Mod 7，p 22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d034302b9d1d4f5d8bd0d3b3da216f03) ， [Mod 7，p 23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0947e649fb8c4cec81e8d586389a955b) ， [Mod 7，p 24](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a249f0a46b0f42e1b47d21cef6945fc5)

正常排序[Mod 6，第 18 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ee7677c9c104432a4a73854347ac1ab)

规范化[Mod 3，p 23](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e8e8fc88471446f1acff6a673e060d02) ， [Mod 3，p 24](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f7d01c14a1d448088af70c9bc76455e4)

部分反射[模 3，p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/17ca5bf5b29f49f8a39ce285424f0c71) ，[模 3，p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/672e7a66995a4138ab1f549b8ac487ec)

粒子聚束[模型 4，第 25 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/06d304136bba48f0b0765fd72c2d89e3)

泡利自旋矩阵[Mod 5, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d5bdb09673cf4285b8fcef4a321fb872) , [Mod 5, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92150e11a0d24611866ac34bfa656509)

泡利矩阵恒等式[Mod 5，p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b6d04009a69547548fc436a87e0787df)

用泡利自旋矩阵表示的任意矩阵[Mod 5，p 4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6282dc2f45af4ecca0bf6e5b8ec305e6)

泡利自旋矩阵，特征值[Mod 5，p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92150e11a0d24611866ac34bfa656509)

泡利自旋矩阵，三重积[模 5，p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/92150e11a0d24611866ac34bfa656509)

微扰理论[Mod 8，p 14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%205d43bfc742234f99931d14529d85cc74) ， [Mod 9，p 6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/be6eb53ccf284913a29233411b130562)

微扰论，一阶[Mod 8，p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/49853a9716914fc5a8128c2126ece8d4)

微扰论，二阶[Mod 8，第 12 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4cc43742895c419ead83eaf2284316b4)

相空间[模型 9，第 4 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3ba56416ee08466a8aaced1372ca4e5b)

光电倍增管[Mod 10，p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/17d9b0a478c740e2a760e2123d25e046) ， [Mod 10，p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3fa44439a51f4b6798041712fe15c1f6)

光子[Mod 10, p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/639705b56cdf4452be85813b0ab6d1aa) , [Mod 10, p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/17d9b0a478c740e2a760e2123d25e046) , [Mod 10,](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3fa44439a51f4b6798041712fe15c1f6) p [3 , Mod 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/21ac47e2311046dd90a8fa818d04985b) , p 4 [, Mod 10, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b0f85020ad434d1ea80c506442c71240) , [Mod 10, p 6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8fc2faec45f8498393b3dd32b2c427f4) , [Mod 10, p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%200172abbbcf814643aba1b98415423703)

光子自反射[模型 3，第 22 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d8107e2772c546299a289d708c6c6d91)

Pickering Lines [7 型，第 44 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d97746bddc9749f3b4b11858be796fb7)

Pickering-Fowler 假设[Mod 7，第 44 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d97746bddc9749f3b4b11858be796fb7)

导航波理论[Mod 2，第 34 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/764cf8e30601490b8d2537d7e3a69df9)

极化[模型 4，第 12 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/84a890f1db764d528aa86c9b3f78856b)，[模型 4，第 13 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38f7327b193247d59759017ac1f22a31)

偏振旋转器[Mod 4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d02d0eb9698a424ba6c63dfdf78d4e14)，第 17 页

狄拉克符号中的极化[Mod 4，p 16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59261d9f300a4e77ae5d342bdd228fcd) ， [Mod 4，p 18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0293707b42984475b272ed0f22cb8e91)

偏振分束器， [Mod 4，第 19 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fe125dd5607f45d9bdc8bb9e16d0dc3c)

偏振干涉仪， [Mod 4，第 19 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fe125dd5607f45d9bdc8bb9e16d0dc3c)

使用偏振器进行实验[，第 4 页，第 13 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38f7327b193247d59759017ac1f22a31)，[第 4 页，第 17 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d02d0eb9698a424ba6c63dfdf78d4e14)，[第 4 页，第 18 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0293707b42984475b272ed0f22cb8e91)

位置本征态[Mod 5，第 23 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a075c99ec62b40b7a14660f166173d8a)

位置运算符[Mod 6，p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/770151b7b5784f1b9a1efe69b9e04819) ， [Mod 6，p 16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/52818f14e224491cacad08e0804c9ae8) ， [Mod 6，p 22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b5)

在 theta-phi 方向的位置状态[Mod 7, p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/657ffe4d315e434c96699944779ad2fd)

概率[模 1，p 14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38c8ffb321e24e33a7a76c3b8589f709) ，[模 1，p 15](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c6afef06a9ce415c972222484c3fc616) ，[模 1，p 16](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e6c8dc7009d148caa6824c860791d7d2)

测量概率[模型 5，第 19 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e4ca12fb7cc4b1cbc8f9441ab10c99f)

投影算子[Mod 2，第 15 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fde893880f4b47f09270ee7a7fc43147)

质子电荷半径[Mod 8，第 13 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/de43aa5afea7461db26e673811eafc3f)

质子质量[模型 7，第 45 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/cb413b2d4ee4484b9d44f755ebbecefc)

量子相机[Mod 4，第 21 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0e953014408149a2b124bb3f6000a226)

量子擦除器[Mod 4，第 12 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/84a890f1db764d528aa86c9b3f78856b)

量子密钥分发[Mod 3，p 29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0363ebe72afb480f85339332c2e84740) ， [Mod 3，p 30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e54c61b3f3304213b214be9466842d2e)

量子之谜[Mod 3，第 19 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f6cc8531943f473da0bbe39af85a678f)， [Mod 3，第 21 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/502e201858954814ae1b3d48d238b1c6)

量子数[Mod 7，p 1](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ec8cc48a28b74fc9a3e61b2bde705369) 、 [Mod 7，p 12](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b6e338d7608c43b798ffdebe2aa022c6) 、 [Mod 7，p 51](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/eaa3177c30b84459bce137b9d3178b93)

量子旋转，一般[Mod 7，p 4](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e699644e5874bd1be948cf224efd49d) ， [Mod 7，p 5](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/657ffe4d315e434c96699944779ad2fd)

光的量子规则[Mod 3，p 2](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e79bf1bde2254d7aa62b930ee904a4ce)

黑暗中的量子视觉[模式 2，第 17 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/036b21a2e74249a88dd536ab4648d989)，[模式 4，第 7 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2ecec2617e274f499f96bfb31adcb381)，[模式 4，第 10 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/390579cc2f144d5199a3e343df2bf0a9)，[模式 4，第 20 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ceef0f0cb0484ce1b74484182110af7a)

量子芝诺效应[Mod 4，第 14 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/d369617ce7794a1a8e937179260aff8a)

Rabi振荡[模型4，第32页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/38e5f25900174f0fad3eac2867376f56)

径向动量， [Mod 7，p30](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1c7e0feabfa24ab599dc53e8e59d0054) ， [Mod 7，p31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/69e9880155c2464592fbb36ca33ad3c3) ， [Mod 8，p9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3d6bc006317a4e4daa31d80106252220)

径向平移[模型 7，第 32 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/af4d7f35e1a9424ab42822ef73c80b8d)

射电天文学[Mod 8，第 5 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6a9f512889db4f67a9c05b1040519e7f)

升序运算符[Mod 6，p 14](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f841cf7667614f8b91443f353e98d4b2) ， [Mod 6，p 18](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6ee7677c9c104432a4a73854347ac1ab) ， [Mod 6，p 22](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b2) ， [Mod 6，p 29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a6a083767d304b1e9a98f3bc10092fdc)

自旋算子

 运算符[Mod 2，第 5 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8c63ce88f40f439ba6c0fed670d09157)

 运算符[Mod 2，第 7 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b353bd69c9894f82a5685bb3619049f7)

 运算符、特征值和特征向量[Mod 2，p 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1da9e49a52af49319c9e19a622be2424)

运算符（总自旋） [Mod 2，p 9](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/faeea1632f204b7da314b803fa4e4a87) ， [Mod 2，p 36](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ac6a73a8c03a4d17913e09c028a6c90e)

 算符（总自旋），特征值[Mod 2，p 36](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ac6a73a8c03a4d17913e09c028a6c90e)

自旋算子矩阵，theta-phi 方向[Mod 5，p 3](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c3246395620344d8852a13039b282b0f)

薛定谔方程[Mod 8，第 18 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6224c9ea1bdc417484af2450b5f4699d)

薛定谔分解法[Mod 7, p 11](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0ad2ee516aec458fa0f62958a68812f7) , [Mod 7, p 20](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f174df015cb84972b0f599cea5632c87)

分离谬误[模型 2，第 25 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e15466db77c8415f8fe693313813e5fe)

变量分离

变量分离，动能[模型 7，第 31 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/69e9880155c2464592fbb36ca33ad3c3)

二维变量分离， [Mod 7，第 36 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/760add9aba4b47a5833c51083158c0cc)

相似变换[Mod 5，第 21 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e83e75302bf24cb5b08dd37a7a69ec29)

简谐振动[模 6，第 7 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/fd5322c7b1344ed781ed2f3d06830977)，[模 6，第 8 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/248771ba228e4600af3545ce10ad0bda)，[模 6，第 19 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/28ddf98d60f844eeb1d5f413629ac998)，[模 6，第 22 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/59c3a180ae354cf6b1a55f41c59725b1)，[模 6，第 26 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2e293d28eabe4c5b83e941a1ca6de771)，[模 6，第 33 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4fcf396347504f2fa756e849b5a93c2a)，[模 6，第 35 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/2225d89ee17b43ef8d1abc6bb5e06471)，[模 7，第 52 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6e633642da4bf58a34335ae5608884)，[模 9，第 4 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%203ba56416ee08466a8aaced1372ca4e5b)

二维简谐振子[Mod 7，第 53 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0f6e633642da4bf58a34335ae5608884)

三维简谐振子[Mod 6，p 32](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/e8f6905973b84dca850d47e367989167) ， [Mod 6，p 40](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4e1085b8720a477980eccdf09f6f95fd)

简谐振子，经典[Mod 9，第 2 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/ae9a799570be43d387460d12b6eb1d44)

简谐振子，因式分解[Mod 6，第 10 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1bcc8c1487964ecf80bf41a4672a2886)

简谐振子，3D各向同性[Mod 7，第39页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/4eaa4b5ea6804506a265230b8bf3821a)

简谐振子，三维各向同性波函数[Mod 7，p 40](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/f7bab0091cf94cdeaa46877c00b16cb2) ， [Mod 7，p 42](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/18b2140c7bd244888da0053ad4324fd1)

单缝实验[Mod 3，第 10 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/67b7b45faf86462c958b80927d03653a)， [Mod 3，第 11 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/73a217615d164213bd41a50d90485059)， [Mod 3，第 12 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/321033f7a1df4253b115e7b4f548804a)， [Mod 3，第 13 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/a67779644d1d4577b778b98cddc614b3/92366face8ce4676bdcbd415240928bb)

单光子源[Mod 4，第 8 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/277641e7721a4c2b8abc18c7703eb22a)

球谐函数[Mod 7，p 6](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3aa481abc20a4bd193f92ce7d5f0ea19) ， [Mod 7，p 10](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/6be0bee54acb46bb9b29bd57efa0ed44) ， [Mod 7，p 50](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/%20cdf6e5f1bddf4dcd99127055dad45a40)

球谐函数，d-wave [Mod 7，第 9 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/79521071544c49b1b9d601bc1ca8c243)

球谐函数，[模 7 的正交性，第 17 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/c0523c942ea24e059a5e0bad7c0c817b)

球谐函数，p 波[模型 7，p 8](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/146f1621b0e44d7099fa72bb630a9c56)

球谐函数，s 波[模型 7，第 7 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/7528c9f002ee4ea1a1743ed282a172a8)

自旋态

自旋单重态[Mod 7，第 12 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/b6e338d7608c43b798ffdebe2aa022c6)

自旋单重态，任意方向[Mod 7, p 13](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/3ee7cd66d2714844ace1ec50a2368091)

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远距离的幽灵行为， [Mod 2，第 19 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/0bfd7ca17fac48b28537ed9672fe7c41)， [Mod 2，第 32 页](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/8df9da8d4c8f44bd84fb939134d6a70c)

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挤压算子[Mod 6, p 28](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/1e1df1eabd2a4f0cb2c106cb46450902) , [Mod 6, p 29](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/a6a083767d304b1e9a98f3bc10092fdc) , [Mod 6, p 31](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/04d764f74d3d433daa4e3647f2a95094) , [Mod 6, p 39](https://courses.edx.org/courses/course-v1:GeorgetownX+PHYSICS-253+2T2025/jump_to_id/db8d47fd92144b12908ee018247914da)

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