

Publications of Kirk T. McDonald

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1392. *Ph205 Lecture 21: Wave Motion*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205121.pdf>
1393. *Ph205 Lecture 22: Standing Waves*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205122.pdf>
1394. *Ph205 Lecture 23: Traveling Waves*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205123.pdf>
1395. *Ph205 Lecture 24: Water Waves*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205124.pdf>

1396. *Ph205 Problem Set 1*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set1.pdf>
1397. *Ph205 Problem Set 2*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set2.pdf>
1398. *Ph205 Problem Set 3*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set3.pdf>
1399. *Ph205 Problem Set 4*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set4.pdf>
1400. *Ph205 Problem Set 5*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set5.pdf>
1401. *Ph205 Problem Set 6*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set6.pdf>
1402. *Ph205 Problem Set 7*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set7.pdf>
1403. *Ph205 Problem Set 8*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set8.pdf>
1404. *Ph205 Problem Set 9*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set9.pdf>
1405. *Ph205 Problem Set 10*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set10.pdf>
1406. *Ph205 Problem Set 11*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set11.pdf>
1407. *Ph205 Problem Set 12*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205set12.pdf>
1408. *Ph205 Final exam 1981*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205final81.pdf>
1409. *Ph205 Final exam 1983*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205final83.pdf>
1410. *Ph205 Final exam 1989*,
<http://physics.princeton.edu/~mcdonald/examples/Ph205/ph205final89.pdf>

Ph304: Advanced Electromagnetism

1411. *Ph304 Problem Set 1*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set1.pdf>

1412. *Ph304 Problem Set 2*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set2.pdf>
1413. *Ph304 Problem Set 3*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set3.pdf>
1414. *Ph304 Problem Set 4*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set4.pdf>
1415. *Ph304 Problem Set 5*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set6.pdf>
1416. *Ph304 Problem Set 6*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set7.pdf>
1417. *Ph304 Problem Set 7*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set8.pdf>
1418. *Ph304 Problem Set 8*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set9.pdf>
1419. *Ph304 Problem Set 9*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set10.pdf>
1420. *Ph304 Problem Set 10*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set11.pdf>
1421. *Ph304 Problem Set 11*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set12.pdf>
1422. *Ph304 Problem Set 12*,
<http://physics.princeton.edu/~mcdonald/examples/ph304set1.pdf>
1423. *Ph304 Midterm Exam (2002)*,
<http://physics.princeton.edu/~mcdonald/examples/ph304midterm02.pdf>
1424. *Ph304 Midterm Exam (2003)*,
<http://physics.princeton.edu/~mcdonald/examples/ph304midterm03.pdf>
1425. *Ph304 Final Exam (2002)*,
<http://physics.princeton.edu/~mcdonald/examples/ph304final02.pdf>
1426. *Ph304 Final Exam (2003)*,
<http://physics.princeton.edu/~mcdonald/examples/ph304final03.pdf>

Ph308: Quantum Mechanics

1427. *Notes on Fermi's Golden Rule* (Oct. 6, 2013),
http://physics.princeton.edu/~mcdonald/examples/golden_rule_101613.pdf

Ph406: Nuclear and Elementary Particle Physics

1428. *Ph406 Problem Set 1* (Feb. 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set1.pdf
1429. *Ph406 Problem Set 2* (Feb. 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set2.pdf
1430. *Ph406 Problem Set 3* (Feb. 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set3.pdf
1431. *Ph406 Problem Set 4* (Mar. 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set4.pdf
1432. *Ph406 Problem Set 5* (Mar. 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set5.pdf
1433. *Ph406 Problem Set 6* (Mar. 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set6.pdf
1434. *Ph406 Problem Set 7* (April 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set7.pdf
1435. *Ph406 Problem Set 8* (April 1992 and 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set8.pdf
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set8_93.pdf
1436. *Ph406 Problem Set 9* (April 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set9.pdf
1437. *Ph406 Problem Set 10* (March 1993),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set10.pdf
1438. *Ph406 Final Exam* (May 1992),
http://physics.princeton.edu/~mcdonald/examples/ph405ph406_final.pdf
http://physics.princeton.edu/~mcdonald/examples/ph405ph406_final_sol.pdf
1439. *Ph406 Problem Set 1* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set1_2014_sol.pdf
1440. *Ph406 Problem Set 2* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set2_2014_sol.pdf

1441. *Ph406 Problem Set 3* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set3_2014_sol.pdf
1442. *Ph406 Problem Set 4* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set4_2014_sol.pdf
1443. *Ph406 Problem Set 5* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set5_2014_sol.pdf
1444. *Ph406 Problem Set 6* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set6_2014_sol.pdf
1445. *Ph406 Problem Set 7* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set7_2014_sol.pdf
1446. *Ph406 Problem Set 8* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set8_2014_sol.pdf
1447. *Ph406 Problem Set 9* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set9_2014_sol.pdf
1448. *Ph406 Problem Set 10* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set10_2014_sol.pdf
1449. *Ph406 Problem Set 11* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set11_2014_sol.pdf
1450. *Ph406 Problem Set 12* (2014),
http://physics.princeton.edu/~mcdonald/examples/ph406/ph406_set12_2014_sol.pdf

Ph410: Physics of Quantum Computation

1451. *Problem Sets (2005-2006)*,
<http://physics.princeton.edu/~mcdonald/examples/ph410problems.pdf>
1452. *Reflections of a (Skeptical) Experimental High-Energy Physicist after Teaching a Course on Quantum Computation* (Feb. 24, 2006),
<http://physics.princeton.edu/~mcdonald/examples/QMtrans1.pdf>

Ph501: Electricity and Magnetism

1453. *Ph501 Lecture 1: Overview of Maxwell's Equations; Electrostatics*,
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture1.pdf>
1454. *Ph501 Lecture 2: Conductors and Dielectrics*,
<http://physics.princeton.edu/~mcdonald/examples/ph501ph501lecture2.pdf>

1455. *Ph501 Lecture 3: Electrostatic Energy, Maxwell Stress Tensor,*
<http://physics.princeton.edu/~mcdonald/examples/ph501ph501lecture3.pdf>
1456. *Ph501 Lecture 4: Potential Theory: Image Methods, 2-D Problems with Rectangular Boundaries,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture4.pdf>
1457. *Ph501 Lecture 5: Potential Theory: 2-D Problems with Cylindrical and Spherical Boundaries,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture5.pdf>
1458. *Ph501 Lecture 6: Potential Theory: 3-D Problems with Cylindrical Boundaries; Conducting Needles, Spheroids, Disks; Use of Conjugate Functions,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture6.pdf>
1459. *Ph501 Lecture 7: Steady Currents; Magnetostatics,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture7.pdf>
1460. *Ph501 Lecture 8: Sources of the Magnetic field; Magnetic Materials,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture8.pdf>
1461. *Ph501 Lecture 9: Faraday's Law,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture9.pdf>
1462. *Ph501 Lecture 10: Electromagnetic Energy, Momentum and Angular Momentum; Inductance,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture10.pdf>
1463. *Ph501 Lecture 11: Introduction to Electromagnetic Waves,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture11.pdf>
1464. *Ph501 Lecture 12: Plane Waves in Dielectric Media,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture12.pdf>
1465. *Ph501 Lecture 13: Plane Waves in Conducting Media,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture13.pdf>
1466. *Ph501 Lecture 14: Waves in Boxes and Pipes,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture14.pdf>
1467. *Ph501 Lecture 15: Sources of the Waves – The Retarded Potentials,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture15.pdf>
1468. *Ph501 Lecture 16: Multipole Radiation; Antennas; Scattering,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture16.pdf>
1469. *Ph501 Lecture 17: Optics and Diffraction; Gaussian Laser Beams,*
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture17.pdf>

1470. *Ph501 Lecture 18: Special Relativity; The 4-Potential of a Moving Charge*,
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture18.pdf>
1471. *Ph501 Lecture 19: Other Force Fields; Significance of Gauge Invariance; Fields of a Moving Charge*,
<http://physics.princeton.edu/~mcdonald/examples/ph501ph501lecture19.pdf>
1472. *Ph501 Lecture 20: Relativistic Radiation Effects: Bremsstrahlung, Synchrotron Radiation*,
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture20.pdf>
1473. *Ph501 Lecture 21: Relativistic Radiation Effects: Čerenkov Radiation, Transition Radiation*,
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture21.pdf>
1474. *Ph501 Lecture 22: Electromagnetic Mass; Radiation Reaction*,
<http://physics.princeton.edu/~mcdonald/examples/ph501ph501lecture22.pdf>
1475. *Ph501 Lecture 23: Interaction of Radiation with Matter – Microscopic View*,
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture23.pdf>
1476. *Ph501 Lecture 24: Mechanics and Electromagnetism*,
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture24.pdf>
1477. *Ph501 Lecture 25: Lasers from a Classical Perspective*,
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture25.pdf>
1478. *Ph501 Lecture 26: Solitons*,
<http://physics.princeton.edu/~mcdonald/examples/ph501/ph501lecture26.pdf>
1479. *Ph501 Problem Set 1*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set1.pdf>
1480. *Ph501 Problem Set 2*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set2.pdf>
1481. *Ph501 Problem Set 3*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set3.pdf>
1482. *Ph501 Problem Set 4*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set4.pdf>
1483. *Ph501 Problem Set 5*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set5.pdf>
1484. *Ph501 Problem Set 6*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set6.pdf>

1485. *Ph501 Problem Set 7*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set7.pdf>
1486. *Ph501 Problem Set 8*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set8.pdf>
1487. *Ph501 Problem Set 9*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set9.pdf>
1488. *Ph501 Problem Set 10*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set10.pdf>
1489. *Ph501 Problem Set 11*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set11.pdf>
1490. *Ph501 Problem Set 12*,
<http://physics.princeton.edu/~mcdonald/examples/ph501set12.pdf>
1491. *Ph501 Midterm Exam (October 2000)*,
http://physics.princeton.edu/~mcdonald/examples/ph501midterm_102300.pdf

Physics 529: Elementary Particle Physics

These lectures, written in the 1980's, give a sense of how the Standard Model came to be.

1492. *Ph529 Lecture 1: Why High Energy?*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52911.pdf>
1493. *Ph529 Lecture 2: History: The Strong Interaction*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52912.pdf>
1494. *Ph529 Lecture 3: History: Electromagnetic and Weak Interactions*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52913.pdf>
1495. *Ph529 Lecture 4: Detecting Elementary Particles*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52914.pdf>
1496. *Ph529 Lecture 5: The Electromagnetic Structure of Matter*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52915.pdf>
1497. *Ph529 Lecture 6: Elastic Scatterin fo Electrons and Hadrons*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52916.pdf>
1498. *Ph529 Lecture 7: Elastic Scatterin fo Electrons and Hadrons, II*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52917.pdf>
1499. *Ph529 Lecture 8: Inetastic Electron Scattering*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52918.pdf>

1500. *Ph529 Lecture 9: Invariance Principles and Conservation Laws*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52919.pdf>
1501. *Ph529 Lecture 10: Charge Conjugation, Isospin, etc.*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529110.pdf>
1502. *Ph529 Lecture 11: 3-Body Decays, Partial-Wave Analysis*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529111.pdf>
1503. *Ph529 Lecture 12: Phenomenology of the Strong Interaction at High Energies*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529112.pdf>
1504. *Ph529 Lecture 13: The Quark Model*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529113.pdf>
1505. *Ph529 Lecture 14: The Quark Model, II*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529114.pdf>
1506. *Ph529 Lecture 15: Heavy Quark States*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529115.pdf>
1507. *Ph529 Lecture 16: The Weak Interaction*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529116.pdf>
1508. *Ph529 Lecture 17: Weak Interactions, II*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529117.pdf>
1509. *Ph529 Lecture 18: CP Violation*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529118.pdf>
1510. *Ph529 Lecture 19: Neutrino Interactions*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529119.pdf>
1511. *Ph529 Lecture 20: The Need for a Better Theory*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529120.pdf>
1512. *Ph529 Lecture 21: The Glashow-Weinberg-Salam Model*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529121.pdf>
1513. *Ph529 Lecture 22: Test of the Glashow-Salam-Weinberg Model*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529122.pdf>
1514. *Ph529 Lecture 23: Quantum Chromodynamics*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph52923.pdf>
1515. *Ph529 Lecture 24: Speculations*
<http://physics.princeton.edu/~mcdonald/examples/ph529/ph529124.pdf>

Short Course on Astroparticle Physics (1988)

1516. *Lecture 1. Techniques of Astroparticle Physics*,
<http://physics.princeton.edu/~mcdonald/papers/schladming1.pdf>
1517. *Lecture 2. Gamma-Ray Protons and Photons*,
<http://physics.princeton.edu/~mcdonald/papers/schladming2.pdf>
1518. *Lecture 3. Solar and Supernova Neutrinos*,
<http://physics.princeton.edu/~mcdonald/papers/schladming3.pdf>
1519. *Lecture 4. Detectors for the Rest of the Universe*,
<http://physics.princeton.edu/~mcdonald/papers/schladming4.pdf>

Short Courses on Accelerator Physics

1520. *A Short Course on Targetry for a Neutrino Factory and Muon Collider* (June 4, 2003)
<http://physics.princeton.edu/~mcdonald/mumu/target/targettrans38.pdf>
1521. *A Short Course on Targetry for Neutrino Superbeams, Neutrino Factories and Muon Colliders* (NuFACT06 Summer Institute, Aug 21, 2006),
<http://physics.princeton.edu/~mcdonald/mumu/target/targettrans53.pdf>