

# Publications of Kirk T. McDonald

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(February 3, 2012)

## Publications in Refereed Journals

1. (with C.Y. Prescott *et al.*) *Wire Orbit Ray Tracing of Magnets Using Magnetostrictive Wire Chamber Techniques*, Nucl. Instr. and Meth. **76**, 173 (1969), [http://puhep1.princeton.edu/~mcdonald/papers/prescott\\_nim\\_76\\_173\\_69.pdf](http://puhep1.princeton.edu/~mcdonald/papers/prescott_nim_76_173_69.pdf)
2. (with K. Eggert *et al.*) *A Streamer Chamber Detector at the CERN Intersecting Storage Rings*, Nucl. Instr. and Meth. **126**, 477 (1975), [http://puhep1.princeton.edu/~mcdonald/papers/eggert\\_nim\\_126\\_477\\_75.pdf](http://puhep1.princeton.edu/~mcdonald/papers/eggert_nim_126_477_75.pdf)
3. (with K. Eggert *et al.*) *Angular Correlations Between the Charged Particles Produced in  $pp$  Collisions at ISR Energies*, Nucl. Phys. **B86**, 201 (1975), [http://www.hep.princeton.edu/~mcdonald/papers/eggert\\_np\\_b86\\_201\\_75.pdf](http://www.hep.princeton.edu/~mcdonald/papers/eggert_np_b86_201_75.pdf)
4. (with P. Darriulat *et al.*) *Conversion Efficiency of Lead for 30-200 MeV Photons*, Nucl. Instr. and Meth. **129**, 105 (1975), [http://puhep1.princeton.edu/~mcdonald/papers/darriulat\\_nim\\_129\\_105\\_75.pdf](http://puhep1.princeton.edu/~mcdonald/papers/darriulat_nim_129_105_75.pdf)
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7. (with K. Eggert *et al.*) *A Measurement of the Proton-Proton Cross Section at the CERN ISR*, Nucl. Phys. **B98**, 93 (1975), [http://www.hep.princeton.edu/~mcdonald/papers/eggert\\_np\\_b98\\_93\\_75.pdf](http://www.hep.princeton.edu/~mcdonald/papers/eggert_np_b98_93_75.pdf)
8. (with C.A. Heusch *et al.*) *Two-Body Photodisintegration of  $^3\text{He}$  and a New Test of Time-Reversal Invariance in the Electromagnetic Interaction*, Phys. Rev. Lett. **37**, 405 (1976), [http://puhep1.princeton.edu/~mcdonald/papers/heusch\\_pr1\\_37\\_405\\_76.pdf](http://puhep1.princeton.edu/~mcdonald/papers/heusch_pr1_37_405_76.pdf)
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12. (with K.J. Anderson *et al.*) *Production of Muon Pairs by 150-GeV/c  $\pi^+$  and Protons*, Phys. Rev. Lett. **36**, 237 (1976),  
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1046. *A Gentler Loop-the-Loop* (Jan. 7, 2012),  
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## Course Notes, Problem Sets and Laboratory Manuals

Ph101: Introductory Physics I (1995-6)

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### **Physics 205: Mechanics**

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1074. *Ph205 Lecture 3: Development of a General Method, Lagrange's Equations,*  
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1075. *Ph205 Lecture 4: Examples of Lagrange's Method,*  
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<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph20519.pdf>
1081. *Ph205 Lecture 10: Central Forces, II*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205110.pdf>
1082. *Ph205 Lecture 11: Mechanical Similarity, Virial Theorem, Collisions*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205111.pdf>
1083. *Ph205 Lecture 12: Scattering*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205112.pdf>
1084. *Ph205 Lecture 13: More About Oscillations*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205113.pdf>
1085. *Ph205 Lecture 14: Coupled Oscillations*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205114.pdf>
1086. *Ph205 Lecture 15: Nonlinear Oscillations*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205115.pdf>
1087. *Ph205 Lecture 16: Accelerated Coordinate Systems*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205116.pdf>
1088. *Ph205 Lecture 17: Motion of a Rigid Body*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205117.pdf>
1089. *Ph205 Lecture 18: Motion of a Rigid Body with No External Torques*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205118.pdf>
1090. *Ph205 Lecture 19: Motion of a Spinning Top Including Gravity*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205119.pdf>
1091. *Ph205 Lecture 20: Rolling without Slipping, Hamiltonian Methods*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205120.pdf>
1092. *Ph205 Lecture 21: Wave Motion*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205121.pdf>
1093. *Ph205 Lecture 22: Standing Waves*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205122.pdf>
1094. *Ph205 Lecture 23: Traveling Waves*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205123.pdf>
1095. *Ph205 Lecture 24: Water Waves*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205124.pdf>

1096. *Ph205 Problem Set 1*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set1.pdf>
1097. *Ph205 Problem Set 2*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set2.pdf>
1098. *Ph205 Problem Set 3*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set3.pdf>
1099. *Ph205 Problem Set 4*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set4.pdf>
1100. *Ph205 Problem Set 5*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set5.pdf>
1101. *Ph205 Problem Set 6*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set6.pdf>
1102. *Ph205 Problem Set 7*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set7.pdf>
1103. *Ph205 Problem Set 8*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set8.pdf>
1104. *Ph205 Problem Set 9*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set9.pdf>
1105. *Ph205 Problem Set 10*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set10.pdf>
1106. *Ph205 Problem Set 11*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set11.pdf>
1107. *Ph205 Problem Set 12*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205set12.pdf>
1108. *Ph205 Final exam 1981*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205final81.pdf>
1109. *Ph205 Final exam 1983*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205final83.pdf>
1110. *Ph205 Final exam 1989*,  
<http://puhep1.princeton.edu/~mcdonald/examples/Ph205/ph205final89.pdf>

### **Ph304: Advanced Electromagnetism**

1111. *Ph304 Problem Set 1*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set1.pdf>

1112. *Ph304 Problem Set 2*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set2.pdf>
1113. *Ph304 Problem Set 3*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set3.pdf>
1114. *Ph304 Problem Set 4*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set4.pdf>
1115. *Ph304 Problem Set 5*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set6.pdf>
1116. *Ph304 Problem Set 6*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set7.pdf>
1117. *Ph304 Problem Set 7*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set8.pdf>
1118. *Ph304 Problem Set 8*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set9.pdf>
1119. *Ph304 Problem Set 9*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set10.pdf>
1120. *Ph304 Problem Set 10*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set11.pdf>
1121. *Ph304 Problem Set 11*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set12.pdf>
1122. *Ph304 Problem Set 12*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304set1.pdf>
1123. *Ph304 Midterm Exam (2002)*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304midterm02.pdf>
1124. *Ph304 Midterm Exam (2003)*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304midterm03.pdf>
1125. *Ph304 Final Exam (2002)*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304final02.pdf>
1126. *Ph304 Final Exam (2003)*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph304final03.pdf>

### **Ph406: Nuclear and Elementary Particle Physics**

1127. *Ph406 Problem Set 1 (Feb. 1993)*,  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set1.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set1.pdf)

1128. *Ph406 Problem Set 2* (Feb. 1993),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set2.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set2.pdf)
1129. *Ph406 Problem Set 3* (Feb. 1993),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set3.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set3.pdf)
1130. *Ph406 Problem Set 4* (Mar. 1993),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set4.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set4.pdf)
1131. *Ph406 Problem Set 5* (Mar. 1993),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set5.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set5.pdf)
1132. *Ph406 Problem Set 6* (Mar. 1993),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set6.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set6.pdf)
1133. *Ph406 Problem Set 7* (April 1993),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set7.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set7.pdf)
1134. *Ph406 Problem Set 8* (April 1992 and 1993),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set8.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set8.pdf)  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set8\\_93.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set8_93.pdf)
1135. *Ph406 Problem Set 9* (April 1993),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set9.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set9.pdf)
1136. *Ph406 Problem Set 10* (March 1993),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406\\_set10.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph406/ph406_set10.pdf)
1137. *Ph406 Final Exam* (May 1992),  
[http://puhep1.princeton.edu/~mcdonald/examples/ph405ph406\\_final.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph405ph406_final.pdf)  
[http://puhep1.princeton.edu/~mcdonald/examples/ph405ph406\\_final\\_sol.pdf](http://puhep1.princeton.edu/~mcdonald/examples/ph405ph406_final_sol.pdf)

### **Ph410: Physics of Quantum Computation**

1138. *Problem Sets (2005-2006)*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph410problems.pdf>
1139. *Reflections of a (Skeptical) Experimental High-Energy Physicist after Teaching a Course on Quantum Computation* (Feb. 24, 2006),  
<http://puhep1.princeton.edu/~mcdonald/examples/QMtrans1.pdf>

### **Ph501: Electricity and Magnetism**

1140. *Ph501 Lecture 1: Overview of Maxwell's Equations; Electrostatics*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture1.pdf>
1141. *Ph501 Lecture 2: Conductors and Dielectrics*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501ph501lecture2.pdf>

1142. *Ph501 Lecture 3: Electrostatic Energy, Maxwell Stress Tensor,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501ph501lecture3.pdf>
1143. *Ph501 Lecture 4: Potential Theory: Image Methods, 2-D Problems with Rectangular Boundaries,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture4.pdf>
1144. *Ph501 Lecture 5: Potential Theory: 2-D Problems with Cylindrical and Spherical Boundaries,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture5.pdf>
1145. *Ph501 Lecture 6: Potential Theory: 3-D Problems with Cylindrical Boundaries; Conducting Needles, Spheroids, Disks; Use of Conjugate Functions,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture6.pdf>
1146. *Ph501 Lecture 7: Steady Currents; Magnetostatics,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture7.pdf>
1147. *Ph501 Lecture 8: Sources of the Magnetic field; Magnetic Materials,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture8.pdf>
1148. *Ph501 Lecture 9: Faraday's Law,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture9.pdf>
1149. *Ph501 Lecture 10: Electromagnetic Energy, Momentum and Angular Momentum; Inductance,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture10.pdf>
1150. *Ph501 Lecture 11: Introduction to Electromagnetic Waves,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture11.pdf>
1151. *Ph501 Lecture 12: Plane Waves in Dielectric Media,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture12.pdf>
1152. *Ph501 Lecture 13: Plane Waves in Conducting Media,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture13.pdf>
1153. *Ph501 Lecture 14: Waves in Boxes and Pipes,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture14.pdf>
1154. *Ph501 Lecture 15: Sources of the Waves – The Retarded Potentials,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture15.pdf>
1155. *Ph501 Lecture 16: Multipole Radiation; Antennas; Scattering,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture16.pdf>
1156. *Ph501 Lecture 17: Optics and Diffraction; Gaussian Laser Beams,*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture17.pdf>

1157. *Ph501 Lecture 18: Special Relativity; The 4-Potential of a Moving Charge*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture18.pdf>
1158. *Ph501 Lecture 19: Other Force Fields; Significance of Gauge Invariance; Fields of a Moving Charge*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501ph501lecture19.pdf>
1159. *Ph501 Lecture 20: Relativistic Radiation Effects: Bremsstrahlung, Synchrotron Radiation*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture20.pdf>
1160. *Ph501 Lecture 21: Relativistic Radiation Effects: Čerenkov Radiation, Transition Radiation*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture21.pdf>
1161. *Ph501 Lecture 22: Electromagnetic Mass; Radiation Reaction*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501ph501lecture22.pdf>
1162. *Ph501 Lecture 23: Interaction of Radiation with Matter – Microscopic View*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture23.pdf>
1163. *Ph501 Lecture 24: Mechanics and Electromagnetism*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture24.pdf>
1164. *Ph501 Lecture 25: Lasers from a Classical Perspective*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture25.pdf>
1165. *Ph501 Lecture 26: Solitons*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501/ph501lecture26.pdf>
1166. *Ph501 Problem Set 1*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set1.pdf>
1167. *Ph501 Problem Set 2*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set2.pdf>
1168. *Ph501 Problem Set 3*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set3.pdf>
1169. *Ph501 Problem Set 4*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set4.pdf>
1170. *Ph501 Problem Set 5*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set5.pdf>
1171. *Ph501 Problem Set 6*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set6.pdf>

1172. *Ph501 Problem Set 7*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set7.pdf>
1173. *Ph501 Problem Set 8*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set8.pdf>
1174. *Ph501 Problem Set 9*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set9.pdf>
1175. *Ph501 Problem Set 10*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set10.pdf>
1176. *Ph501 Problem Set 11*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set11.pdf>
1177. *Ph501 Problem Set 12*,  
<http://puhep1.princeton.edu/~mcdonald/examples/ph501set12.pdf>
1178. *Ph501 Midterm Exam (October 2000)*,  
[http://puhep1.princeton.edu/~mcdonald/examples/ph501midterm\\_102300.pdf](http://puhep1.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.

1179. *Ph529 Lecture 1: Why High Energy?*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52911.pdf>
1180. *Ph529 Lecture 2: History: The Strong Interaction*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52912.pdf>
1181. *Ph529 Lecture 3: History: Electromagnetic and Weak Interactions*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52913.pdf>
1182. *Ph529 Lecture 4: Detecting Elementary Particles*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52914.pdf>
1183. *Ph529 Lecture 5: The Electromagnetic Structure of Matter*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52915.pdf>
1184. *Ph529 Lecture 6: Elastic Scatterin fo Electrons and Hadrons*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52916.pdf>
1185. *Ph529 Lecture 7: Elastic Scatterin fo Electrons and Hadrons, II*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52917.pdf>
1186. *Ph529 Lecture 8: Inetastic Electron Scattering*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52918.pdf>

1187. *Ph529 Lecture 9: Invariance Principles and Conservation Laws*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52919.pdf>
1188. *Ph529 Lecture 10: Charge Conjugation, Isospin, etc.*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529110.pdf>
1189. *Ph529 Lecture 11: 3-Body Decays, Partial-Wave Analysis*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529111.pdf>
1190. *Ph529 Lecture 12: Phenomenology of the Strong Interaction at High Energies*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529112.pdf>
1191. *Ph529 Lecture 13: The Quark Model*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529113.pdf>
1192. *Ph529 Lecture 14: The Quark Model, II*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529114.pdf>
1193. *Ph529 Lecture 15: Heavy Quark States*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529115.pdf>
1194. *Ph529 Lecture 16: The Weak Interaction*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529116.pdf>
1195. *Ph529 Lecture 17: Weak Interactions, II*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529117.pdf>
1196. *Ph529 Lecture 18: CP Violation*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529118.pdf>
1197. *Ph529 Lecture 19: Neutrino Interactions*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529119.pdf>
1198. *Ph529 Lecture 20: The Need for a Better Theory*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529120.pdf>
1199. *Ph529 Lecture 21: The Glashow-Weinberg-Salam Model*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529121.pdf>
1200. *Ph529 Lecture 22: Test of the Glashow-Salam-Weinberg Model*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529122.pdf>
1201. *Ph529 Lecture 23: Quantum Chromodynamics*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph52923.pdf>
1202. *Ph529 Lecture 24: Speculations*  
<http://puhep1.princeton.edu/~mcdonald/examples/ph529/ph529124.pdf>

## Short Course on Astroparticle Physics (1988)

1203. *Lecture 1. Techniques of Astroparticle Physics*,  
<http://puhep1.princeton.edu/~mcdonald/papers/schladming1.pdf>
1204. *Lecture 2. Gamma-Ray Protons and Photons*,  
<http://puhep1.princeton.edu/~mcdonald/papers/schladming2.pdf>
1205. *Lecture 3. Solar and Supernova Neutrinos*,  
<http://puhep1.princeton.edu/~mcdonald/papers/schladming3.pdf>
1206. *Lecture 4. Detectors for the Rest of the Universe*,  
<http://puhep1.princeton.edu/~mcdonald/papers/schladming4.pdf>

## Short Courses on Accelerator Physics

1207. *A Short Course on Targetry for a Neutrino Factory and Muon Collider* (June 4, 2003)  
<http://www.hep.princeton.edu/~mcdonald/mumu/target/targettrans38.pdf>
1208. *A Short Course on Targetry for Neutrino Superbeams, Neutrino Factories and Muon Colliders* (NuFACT06 Summer Institute, Aug 21, 2006),  
<http://www.hep.princeton.edu/~mcdonald/mumu/target/targettrans53.pdf>