Lecture plan for Atomic Physics (FYSC11) spring 2019.

**Literature:**
AP: C. Foot, Atomic Physics.
QM: S. McMurry, Quantum Mechanics
GO: G. Ohlén, Phenomena of the quantum world.

Course week 1. 21 – 25 Jan (14 h + 2 h)


Jan 24. Problem-solving exercis.

Course week 2. 28/1 – 1/2 (8 h + 2 h)


Jan 30. Problem-solving exercis.

Course week 3. 4 – 8 Feb (8 h + 2 h)

Feb 4. Problem-solving exercis.

Monday 4/2. Deadline optional hand-in 1 kl 17.00
Many-electron atoms continued: $LS$-coupled wavefunctions, $jj$-coupling, intermediate coupling. SP: 2.3.3, 2.3.4, AP: 5.3.
Radiative transitions, Einstein coefficients, lifetimes, laser principles, selection rules and relative intensities in $LS$-multiplets. SP: 2.4, 7.5, 7.8, 7.10, 14. AP: 1.7, 5.4 and 7.1 and 7.2. Zeeman effect and Hyperfine structure. SP: 3.8, 3.9. AP: 5.5, 6 – 6.2
Line widths and broadening effects. SP: 8, AP: 8.1, 8.2.

Course week 4. 11 – 15 Feb (2 h + 2 h + 2 h + lab)

Feb 11 Problem-solving exercis.
Feb 12. Compulsory Lab preparation. The Fabry-Perot interferometer SP 13.3
Laboratory sessions: “2-electron spectra”, “Diode laser spectroscopy” and “Zeeman effect”

Course week 5 and 6. 18/2 – 1/3: Laboratory sessions continued.

Course week 7. 4 – 8 March (4 h + 4 h)
March 4 and 7 Problem-solving exercises.
Molecular structure and spectra. SP: 5 and 6.1 and 6.2.

Course week 8. Monday 11/3 (2 h):

Monday 11/3: Deadline optional hand-in 2 kl 17.00
Monday 11/3: Prof. Joachim Schnadt: Atomic physics at synchrotrons

Course week 9. 18 – 22 March: (4 h +4 h + exam)
Summary lecture.
Friday 22/3. Written exam. Monday 25/3 10-12 Lab visits Atomic Physics