

PHYSICS 880A20

ATOMIC AND MOLECULAR PHYSICS

WINTER QUARTER 2003

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Office Hours: feel free to drop in anytime
Class web page:
http://www.physics.ohio-state.edu/~eric/Physics_880.html

Required text: none. Some useful texts:

J. I. Steinfeld, "Molecules and Radiation: An Introduction to Modern Molecular Spectroscopy" (M.I.T. Press, 1993, 2nd edition). (basic)

C. H. Townes & A. L. Schawlow, "Microwave Spectroscopy" (Dover Publications, 1975) (cheap and a classic)

W. Gordy & R. L. Cook, "Microwave Molecular Spectra" (Wiley & Sons, 3rd edition, 1984) (expensive and thorough)

Important handouts will be given out or put on the web page.

Grading: There will be homework assignments and a comprehensive final. Homework assignments will be handed out biweekly. You are allowed to collaborate while doing the homeworks. The grading will be apportioned as follows:

Homeworks	50%
Final	50%

SYLLABUS

I. The Vibrating Rotor

1/6	M	Born-Oppenheimer Approximation
1/8	W	Energy levels
1/10	F	Rotational Spectroscopy
1/13	M	Spin considerations

II. Symmetric Tops

1/15	W	Angular momentum considerations
1/17	F	Rotational spectra and intensities
1/20	M	NO CLASS
1/22	W	Symmetry and spin statistics

III. Asymmetric Tops

1/24	F	Asymmetry parameters and correlation tables
1/27	M	Quantum mechanical solution I
1/29	W	Quantum mechanical solution II
1/31	F	NO CLASS
2/3	M	Intensities of transitions
2/5	W	Spin considerations
2/7	F	Centrifugal Distortion I
2/10	M	Centrifugal Distortion II

IV. Internal Rotors

2/12	W	Large amplitude motions
2/14	F	The PAM method
2/17	M	Other approaches
2/19	W	Other approaches

V. Broadening Mechanisms

2/21	F	Basic treatments of pressure broadening
2/24	M	Anderson theory I
2/26	W	Anderson theory II
2/28	F	Other types of broadening

VI. Molecular Astronomy

3/3	M	Interstellar clouds
3/5	W	Equation of radiative transfer
3/7	F	Determination of column densities
3/10	M	Interstellar chemistry I
3/12	W	Interstellar chemistry II
3/14	F	Interstellar chemistry III