
Quantum Mechanics

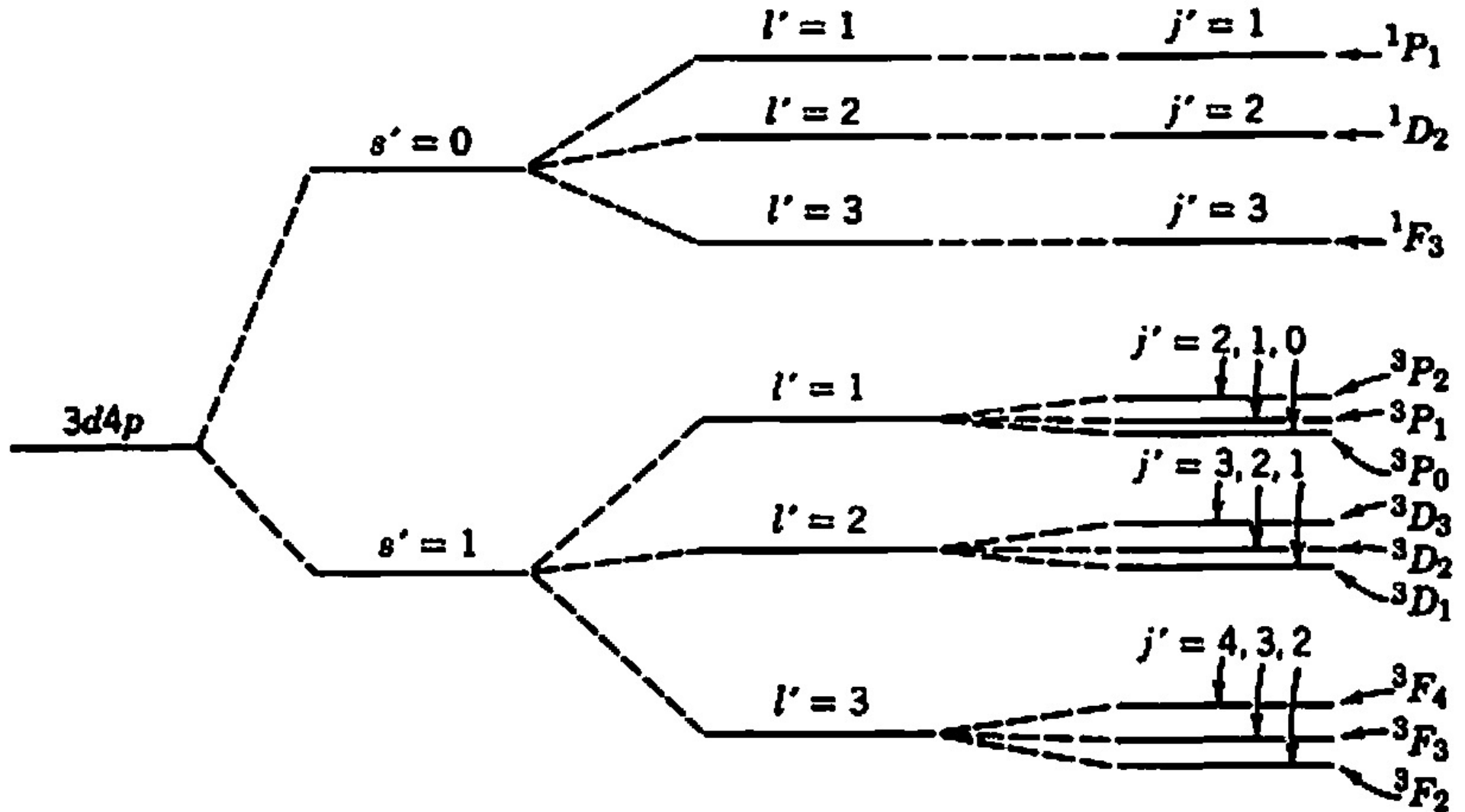
Physics 237

Frank L. H. Wolfs
Department of Physics and Astronomy
University of Rochester

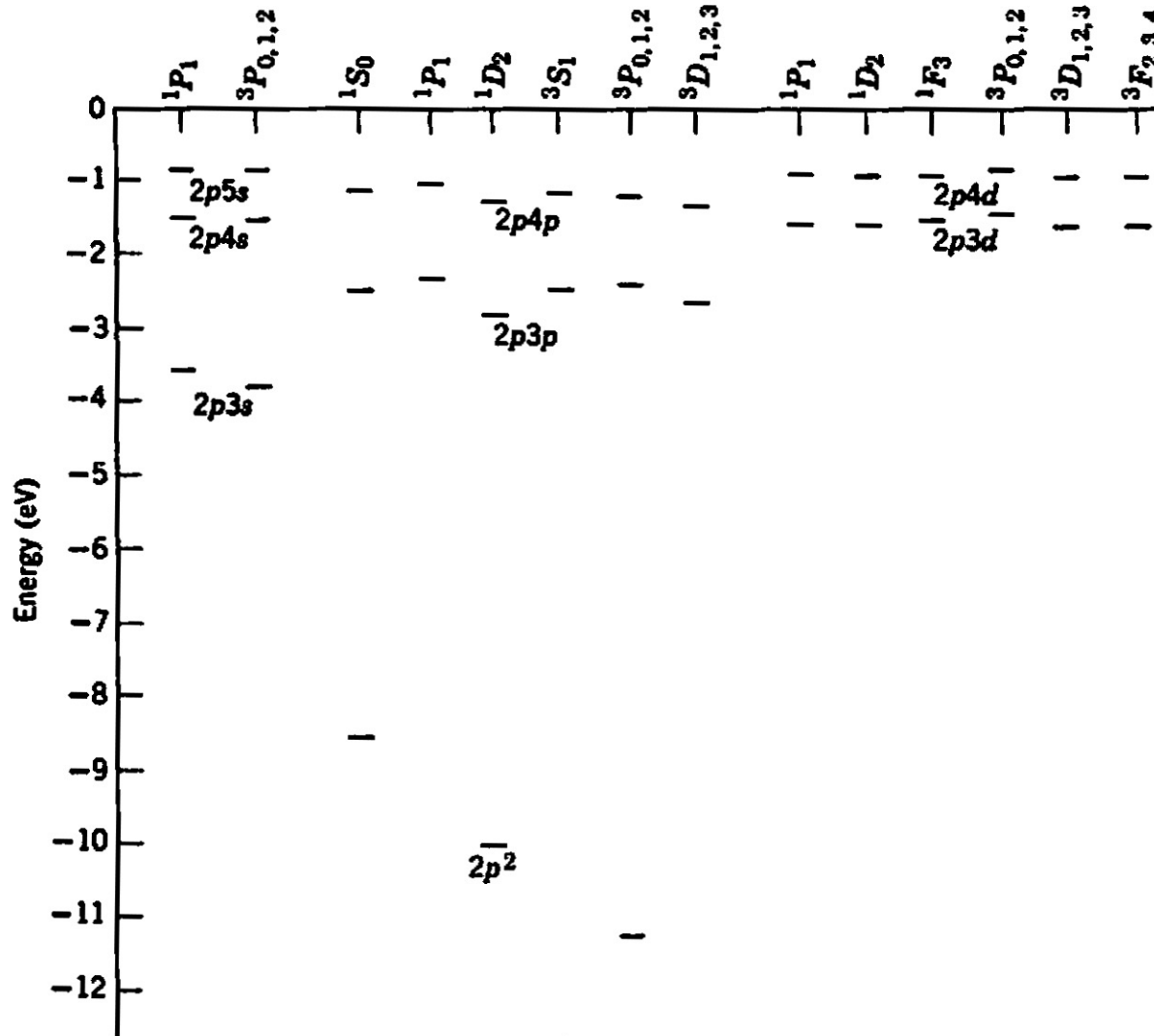
Announcements

- No homework due on Friday March 25.
- Next homework, homework set # 8, is due on Friday April 1 (note: this is not an April 1 joke).
- Exam # 2 will be returned to you next week:
- The solutions to Exam # 2 are posted on our website.
- There is a strong correlation between lecture attendance and the score on problem 4e.

Splitting of Energy Levels. Coulomb and Spin-Orbit Interactions.



Levels in Carbon.

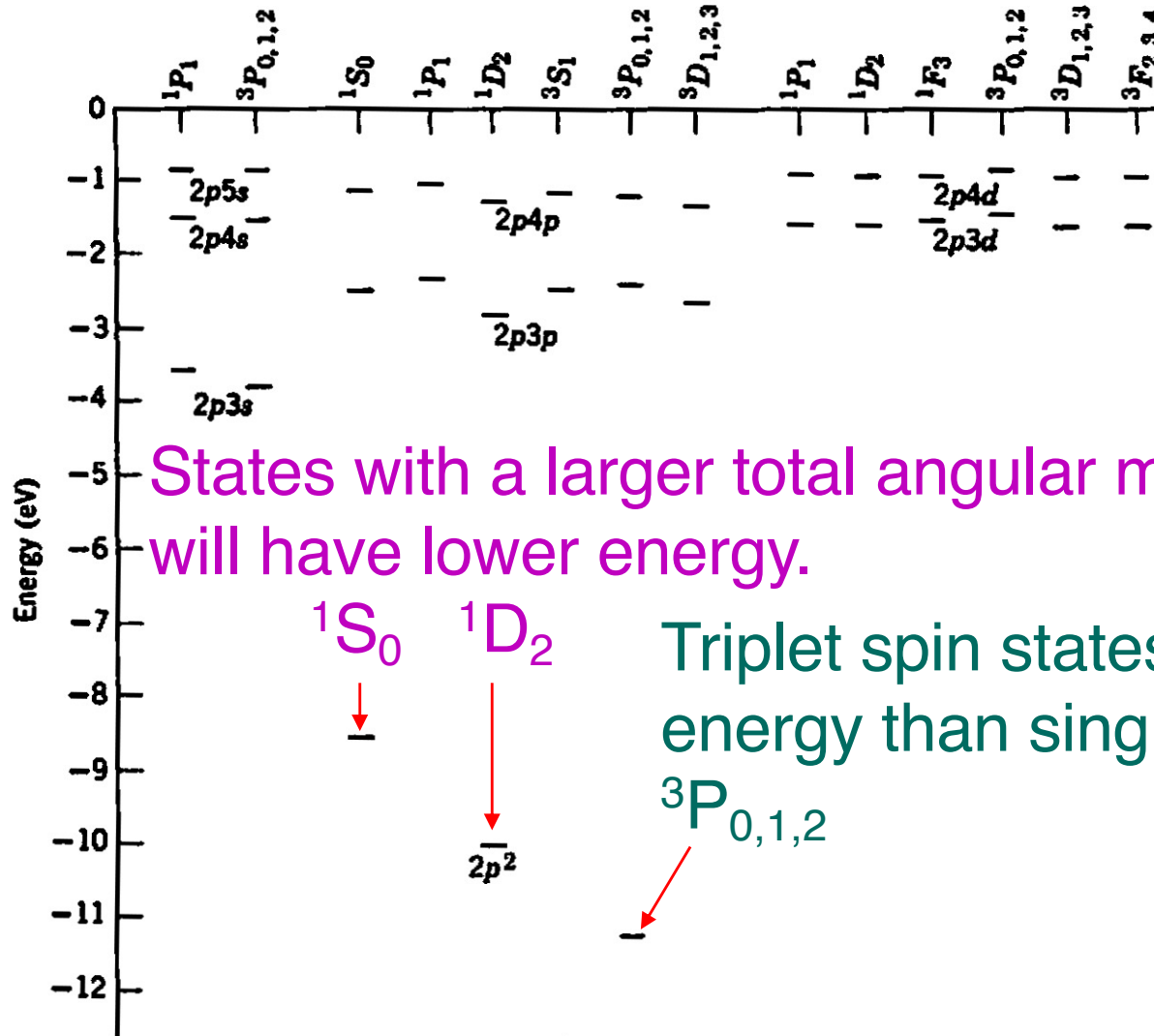


Counting states

m_{ℓ_1}	m_{s_1}	m_{ℓ_2}	m_{s_2}	$m_{\ell_{12}}$	$m_{s_{12}}$	$m_{j_{12}}$
1	+1/2	1	-1/2	2	0	2
		0	+1/2	1	1	2
		0	-1/2	1	0	1
		-1	+1/2	0	1	1
		-1	-1/2	0	0	0
1	-1/2	0	+1/2	1	0	1
		0	-1/2	1	-1	0
		-1	+1/2	0	0	0
		-1	-1/2	0	-1	-1
0	+1/2	0	-1/2	0	0	0
		-1	+1/2	-1	1	0
		-1	-1/2	-1	0	-1
0	-1/2	-1	+1/2	-1	0	-1
		-1	-1/2	-1	-1	-2
-1	+1/2	-1	-1/2	-2	0	-2

m_j	#	1D_2	${}^3P_{0,1,2}$	Not Assigned
2	2	1	1	0
1	3	1	2	0
0	5	1	3	1
-1	3	1	2	0
-2	2	1	1	0

Levels in Carbon.



Pieter Zeeman.

A Dutchman good to know.



http://www.museumboerhaave.nl/contact/persfotos_einstein/EinsteinZeemanEhrenfest.jpg

The Zeeman Effect.

Transitions between any singlet states in atom with even number of optically active electrons.



No field



Weak field



Normal

Transitions between doublet first excited state and doublet ground state in the sodium atom.

$^2P_{1/2}$ to $^2S_{1/2}$



$^2P_{3/2}$ to $^2S_{1/2}$



Anomalous



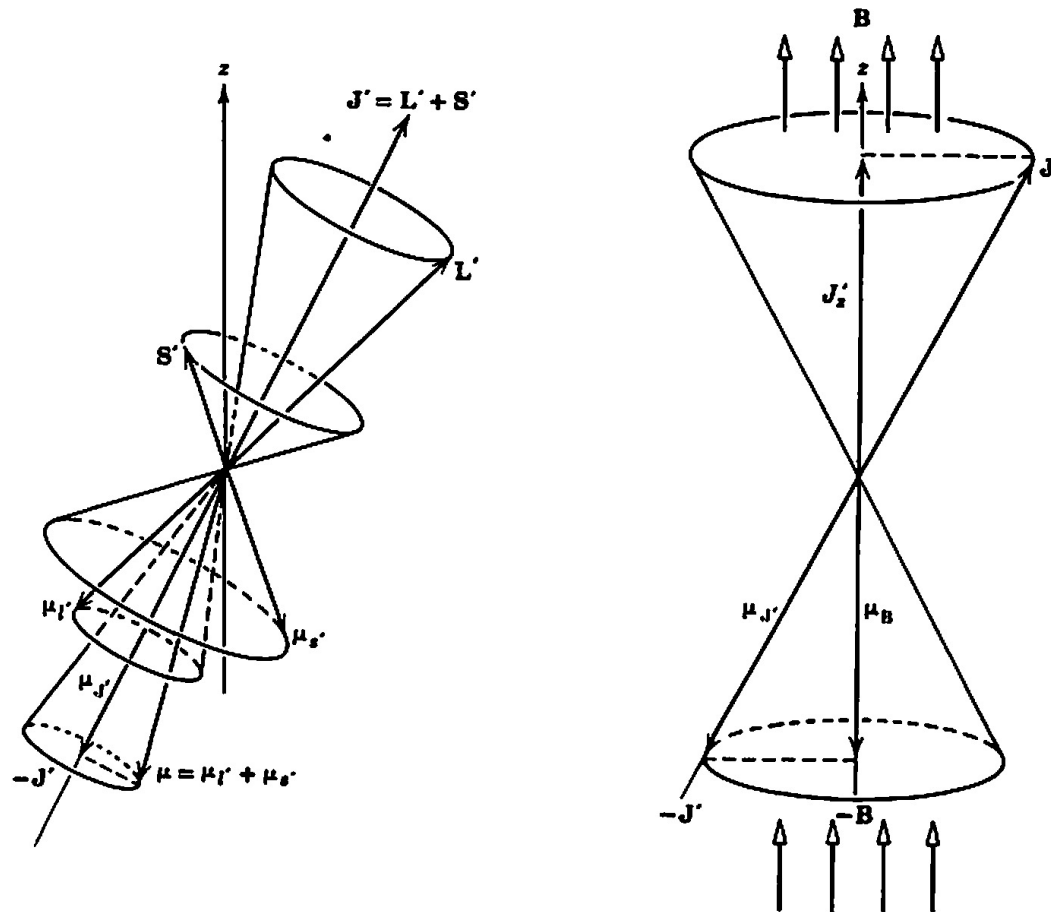


3 Minute 09 Second Intermission.

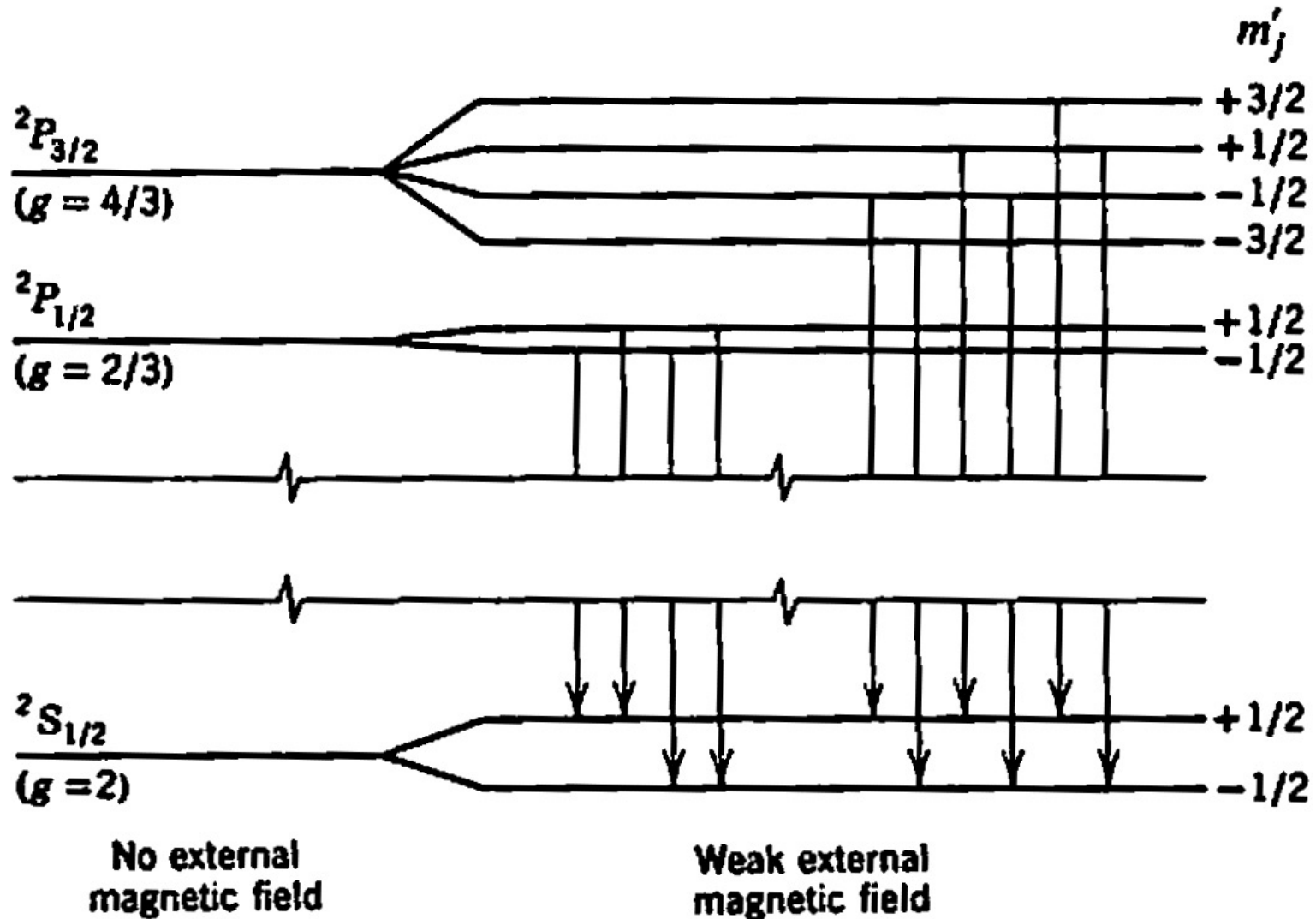
- Since paying attention for 1 hour and 15 minutes is hard when the topic is physics, let's take a 3 minute 09 second intermission.
- You can:
 - Stretch out.
 - Talk to your neighbors.
 - Ask me a quick question.
 - Enjoy the fantastic music.



Magnetic moments - complicated.



Splitting of Energy Levels.



ENOUGH FOR TODAY?