

中央大學八十九學年度碩士班研究生入學試題卷

天文研究所 不分組 科目：

近代物理

共 1 頁 第 1 頁

1. The blackbody radiation is $B_\nu(T) = (2h\nu^3/c^2)/(e^{h\nu/kT} - 1)$; derive the Wien displacement law: $\lambda_{\max} T \sim 0.2 hc/k$. (20 points)
2. Derive the maximum wavelength shift in the Compton scattering of photons from electrons. (20 points)
3. The zero-point vibration energy for H_2 is 0.265 eV. Compare the vibration energy levels of H_2 , D_2 , and HD numerically for the low-lying states. (20 points)
4. Show that at $T = 0^\circ K$ the average energy of an electron is $(3/5) \varepsilon_F$ (Fermi energy). (20 points)
5. Evaluate the Lande g factors for 3P_1 and $^2P_{3/2}$ levels. (20 points)