

## Phys 402: Applications of Quantum Mechanics

Lecture: "Why pulses"

Consider hydrogen atoms initially at their ground state "1s" at  $t=0$ . A weak uniform electric field along the direction of  $z$  is applied at  $t=0$ .

- 1) Describe what happens to the hydrogen ground state using the 1<sup>st</sup> order perturbation theory you know.
  
- 2) Using the result in 1), describe what happens to the hydrogen atoms initially in the ground state. What is the probability of finding them in the 1<sup>st</sup> excited state?
  
- 3) How strong the electric field has to be to have a substantial probability in one of the excited states? Compare the estimate with typical electric field in lightning (more than 3 million V per meter).