Using Two-Photon decay to test Relativistic Many-Body Theory

Two-photon decay rate:

$$A(\omega_1)d\omega_1 = \varphi(\omega_1)\left|M(\omega_1)\right|^2 d\omega_1$$

$$\Uparrow \text{ phase space, etc.}$$

$$M(\omega_1) = \sum_n \frac{\langle f\|H_r(\omega_2)\|n\rangle\langle n\|H_r(\omega_1)\|i\rangle}{E_n - E_i + \hbar\omega_1} + \cdots$$

Advantages

- Sensitive test of no-virtual-pair approximation - sum over negative energy states appears in lowest order
- Clean Experiments - coincidence condition provides a unique identification of the process - metastable states are an advantage

Disadvantages

- It is necessary to measure the photon energy distribution (particularly at High-Z).
- Precision measurements of spectral distribution are experimentally challenging.