Plan for Two-Photon Experiments in He-like Heavy Ions.

1. Make precise measurements of the spectral distribution of two-photon decay at intermediate-Z and at high-Z to test the predicted Z-dependence.

    - The spectral distribution is sensitive to the deviation from the non-relativistic (NR) theory at intermediate Z. (Note: "corrected" theoretical lifetimes agree with experiment).

    - At high-Z the lifetimes are too short to measure well so the spectral distribution is the only way to test the calculations.

2. At intermediate Z choose Nickel.

    - Existing measurements in krypton (Z=36) are not precise enough. Need new approach = comparison technique.

    - The He-like/H-like comparison technique requires lower Z where intense beams of both charge states can be obtained at ATLAS.

    - Nickel (Z=28) is the best choice since the decay length (about 1 cm) is ideal, and the transition energy (8 keV) is not too small .

3. At High-Z choose Gold.

    - Intense beams of Gold (Z=79) are available at the heavy ion synchrotron SIS at GSI in Germany.

    - $\alpha Z \approx 0.6$ - Relativistic corrections are important!- virtual pairs could play a role