While photoionization of helium has been studied thoroughly, beryllium (1s^22s^2), the next helium-like atom in the periodic table, has been investigated only marginally by comparison. Double excitations in the Be valence-shell region have been studied experimentally as well as theoretically in the past. In these experiments [1,2] vacuum sparks were used to photo-excite and ionize Be atoms and absorption spectra were recorded on high-sensitive film.

In general, for atomic photoexcitation resonances above the first ionization limit, autoionization becomes possible by interaction with one or more single-ionization continua. This leads to an asymmetric resonance profile in the single-ionization cross section. A theoretical description of this process was introduced by Fano [3] and refined later by Shore and Starace. Since autoionization is a consequence of electron correlation, a measurement of the resonance profile for comparison with theory can provide important information towards our understanding of how electron correlations affect a simple system. We will present our autoionization-profile measurements of the Be 2pns (n=3-8) and 2pnd (n=3-5) double excitations [4]. Since the 1s electrons do not actively participate in the autoionization process, Be appears to be a system only slightly more complicated than He. However it is very different from He insofar as the series of autoionization resonances starts immediately above the first ionization threshold (see Fig. 1). Another difference to He is that the Be 2pns resonances are much broader due to a strong coupling to a rather weak continuum.

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References: