

Plasmons modelling in core-level photoemission: state-of-the-art and beyond

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After a general introduction of plasmons in photoemission, we will consider the different methods that have been used so far in order to model plasmon peaks. Then, we will focus on one method in particular, Hedin's quasi-boson approach^{1,2} and see how it can be incorporated within the multiple scattering framework³. The pioneering work was done by T. Fujikawa and coworkers^{4,5}. Following their approach, we will identify the key parameters that are needed in this description and find that they only involve the dielectric function and the core-state wave function. All other ingredients in this theoretical model are already part of the core-state cross-section modelling.

In a second part, we will see how we can improve over this state-of-the-art description. First by considering the exact core-state wave function, and then by using beyond-RPA *model* dielectric functions in order to describe the plasmon excitation process. We will in particular discuss the effect of the modelling of the dielectric function on the fluctuation potential that describes the excitation of the plasmon.

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