New many-body approach to photoemission and spectral functions[1] CARL-OLOF ALMBLADH, CLAUDIO VERDOZZI, Mathematical Physics, Lund University (Sweden) — A new method for the description of photoemission and other spectra is presented. The key idea is to expand the transition amplitudes rather than the spectral function themselves. This leads to spectral intensities of a Golden-rule-like form. In the language of Keldysh path-ordered technique, contributions to "lesser" functions such as $G^<$ are classified into loss and no-loss diagrams, and in each diagram transition amplitudes can be identified. Conserving theories in the sense of Kadanoff and Baym exactly fulfill macroscopic conservation laws but may violate the positiveness of spectral functions. In contrast, the present scheme may violate conservation laws but it will always give positive spectra, thus being especially suitable for photoemission and other processes where spectral shapes are of primary interest. As examples, we will discuss the one-electron spectral function beyond GW theory and in presence of phonons. In both cases we find subtle interference effects between self-consistency and vertex corrections and a marked improvement of satellites. As a final example, photoemission beyond the sudden approximation will be discussed.

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