Insights in the T-matrix formalism PINA ROMANIELLO, LSI, Ecole Polytechnique and ETSF, FRIEDHELM BECHSTEDT, Friedrich-Schiller-Universitaet Jena and ETSF, LUCIA REINING, LSI, Ecole Polytechnique and ETSF — In many-body perturbation theory the self-energy $\Sigma = iGW\Gamma$ plays a key role since it contains all the many body effects of the system. The exact self-energy is not known and approximations are needed. As first approximation one can neglect the vertex $\Gamma$, and obtain the GW approximation. In some cases this is not sufficient, and one needs to go beyond this approximation. In this work we elucidate the concept of T-matrix [1] and its relation with Hedin’s equations [2]: we look for a unified framework including GW, T-matrix, and GWΓ. We discuss this in relation to two main shortcomings of the GW approximation: the self-screening error and the incorrect atomic limit [3].