**Kohn-Sham DFT**

$$\left[-\frac{\nabla^2}{2} + v_{ext} + V^{\mathcal{H}x}\right]\phi_p^{\mathcal{KS}} = \varepsilon_p^{\mathcal{KS}}\phi_p^{\mathcal{KS}}$$

*Fundamental gap*

**GW approximation**

$$\varepsilon_p^{GW} = \varepsilon_p^{\mathcal{KS}} + \left\langle\phi_p^{\mathcal{KS}}\middle|\Sigma^{GW}(\varepsilon_p^{GW}) - V^{x}\middle|\phi_p^{\mathcal{KS}}\right\rangle$$

*Ionization potentials*
*Electron affinities*

**(Inverse) photoemission spectroscopy**

*Excitonic effect*

**Bethe-Salpeter equation**

$$\begin{pmatrix} \boldsymbol{A} & \boldsymbol{B} \\ -\boldsymbol{B}^* & -\boldsymbol{A}^* \end{pmatrix}\begin{pmatrix} \boldsymbol{X}_m \\ \boldsymbol{Y}_m \end{pmatrix} = \Omega_m \begin{pmatrix} \boldsymbol{X}_m \\ \boldsymbol{Y}_m \end{pmatrix}$$

*Optical excitations*

**Optical spectroscopy**