Abstract: The dynamic of three one dimensional non relativistic spinless quantum particles interacting through delta potentials is governed by the Hamiltonian

$$\sum_{i=1}^{3} -\frac{\Delta_i}{2m_i} + \sum_{1\leq i<j\leq 3} Z_i Z_j \delta(x_i - x_j) \quad \text{acting} \quad \bigotimes_{i=1}^{3} L^2(\mathbb{R})$$

where $x_i \in \mathbb{R}$ denotes the position of the i^{th} particle, $\Delta_i := \partial_{x_i}^2$, $m_i > 0$, $Z_i \in \mathbb{R}$ the mass and the charge of this i^{th} particle. The question we address is: for what values of the masses and the charges does this Hamiltonien possess a bound state, i.e. a discrete eigenvalue. We shall give a fairly complete picture in the particular case, $m_1 = M > m_2 = m_3 = m$, $Z_1 > 0$, $Z_2 = Z_3 = -1$. This case corresponds to a dynamical Helium-type of atom. Applications to the study of atoms in high magnetic field and to trions on carbon nanotube will be briefly reviewed. Despite the physical jargon, this will be a genuine mathematical seminar in spectral theory. This is the result of a collaboration with H. Cornean and B. Ricaud.