La vie et la mort d'une onde plasma
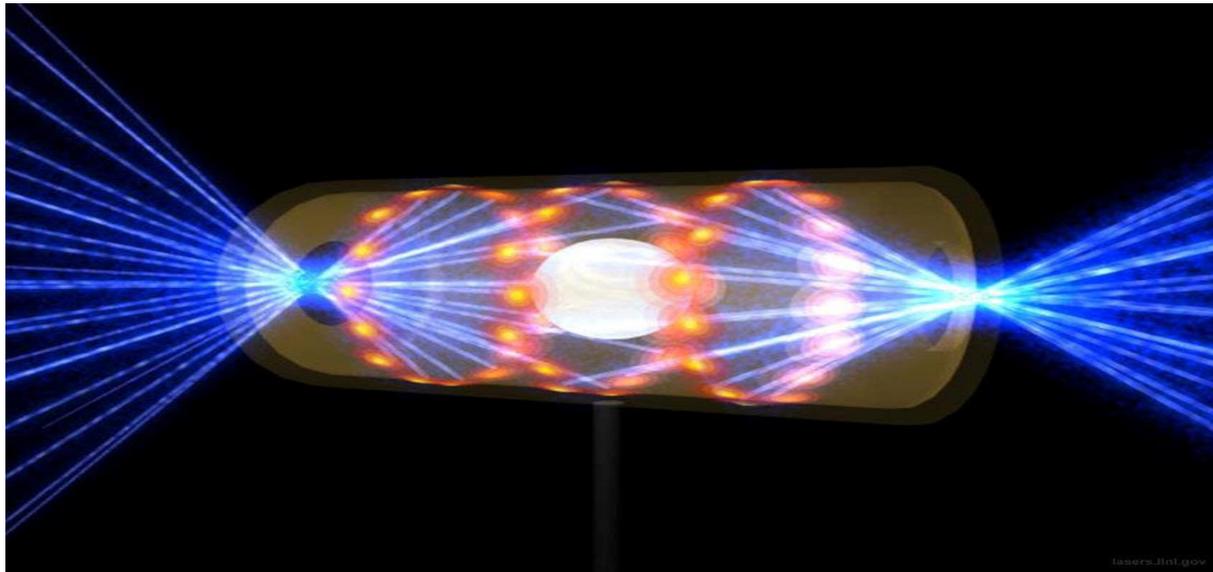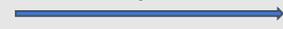
- Le système d'équations Vlasov-Maxwell

$$\frac{\partial f}{\partial t} + v\frac{\partial f}{\partial x} - (\vec{E} + \vec{v} \times \vec{B}) \cdot \frac{\partial f}{\partial v} = 0$$

$$\left| \vec{\nabla} \cdot \vec{E} = 1 - \int_{\mathbb{R}^3} f d^3\vec{v} \right. \qquad \left| \vec{\nabla} \times \vec{E} + \frac{\partial \vec{B}}{\partial t} = \vec{0} \right.$$

$$\left| \vec{\nabla} \times \vec{B} - \frac{\partial \vec{E}}{\partial t} = - \int_{\mathbb{R}^3} \vec{v} f d^3\vec{v} \right. \qquad \left| \vec{\nabla} \cdot \vec{B} = 0 \right.$$

1D en espace

Adiabatique
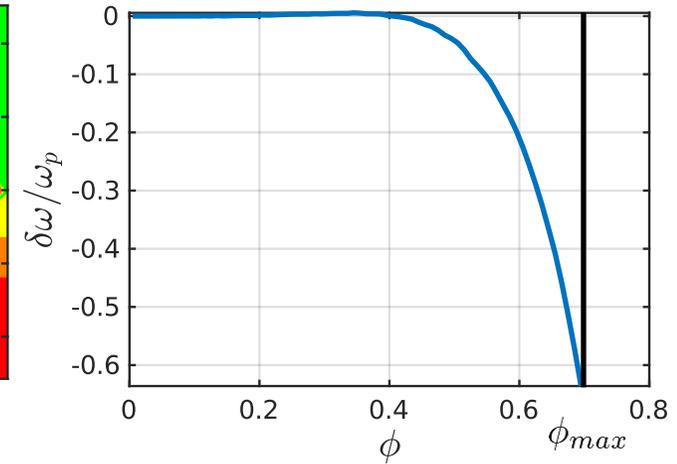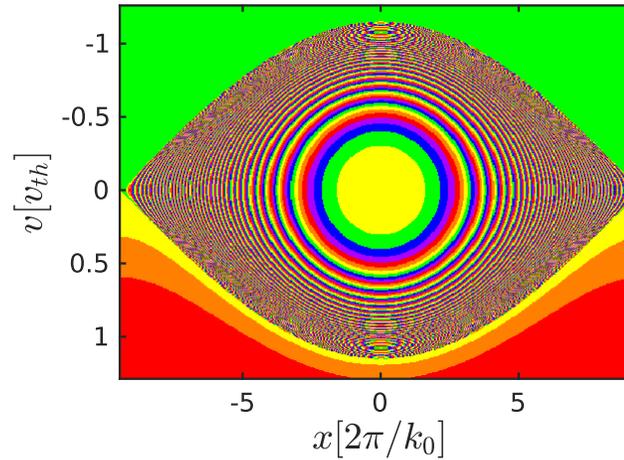
- Le système d'équations Vlasov-Maxwell perturbé

$$\frac{\partial f_1}{\partial t} + v\frac{\partial f_1}{\partial x} - (\vec{E_0} + \vec{v} \times \vec{B_0}) \cdot \frac{\partial f_1}{\partial v} = (\vec{E_1} + \vec{v} \times \vec{B_1}) \cdot \frac{\partial f_0}{\partial v}$$

$$\left| \vec{\nabla} \cdot \vec{E_1} = - \int_{\mathbb{R}^3} f_1 d^3\vec{v} \right. \qquad \left| \vec{\nabla} \times \vec{E_1} + \frac{\partial \vec{B_1}}{\partial t} = \vec{0} \right.$$

$$\left| \vec{\nabla} \times \vec{B_1} - \frac{\partial \vec{E_1}}{\partial t} = - \int_{\mathbb{R}^3} \vec{v} f_1 d^3\vec{v} \right. \qquad \left| \vec{\nabla} \cdot \vec{B_1} = 0 \right.$$

Résolution analytique et numérique