

## Première partie

# Dark Fluid

Friedmann–Lemaître Universe with different fluids : photons, neutrinos, baryons and a dark fluid, the Friedmann equations take the form :

$$H^2 = \frac{8\pi G}{3c^4}\rho - \frac{k}{a^2} \quad (1)$$

$$\rho = \rho_r + \rho_b + \rho_D$$

where r denotes the radiation (i.e. photons + neutrinos), b the baryonic matter and D the dark fluid.

## Deuxième partie

# Hypercomplex General Relativity (HGR)

Friedmann–Lemaître Universe with different fluids : photons, neutrinos, baryons and a dark fluid, the Friedmann equations take the form :

$$H^2 = \frac{8\pi G}{3c^4}\rho - \frac{k}{a^2} \quad (2)$$

$$\rho = \rho_r + \rho_b + \rho_{eff}(\Omega, \phi, C)$$

$\rho_{eff}(\Omega, \phi, C)$  groups the effective geometric contributions (Weyl, internal sector and couplings).