La charge des grains dans le milieu interstellaire

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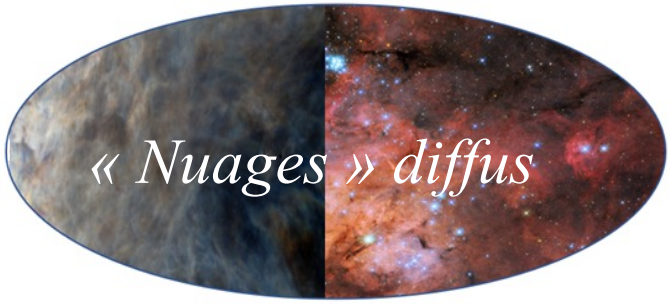
Le milieu interstellaire – cycle de la matière



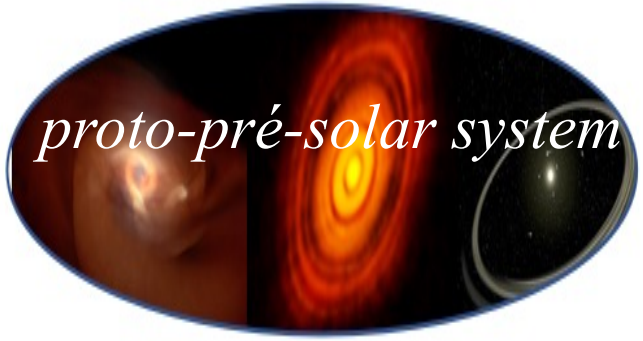
grand, long(Gy), peu dense, chaud

petit, court (My), dense, froid

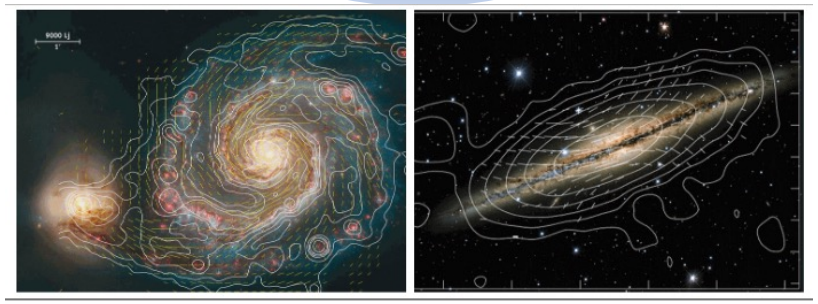
Composition (today):
H=1; He=0.1; Z=0.01
+ poussières (0.01)

très petit, très court (ky), très dense, très chaud

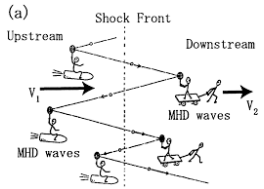
petit, variable (My-Gy), dense, tiède

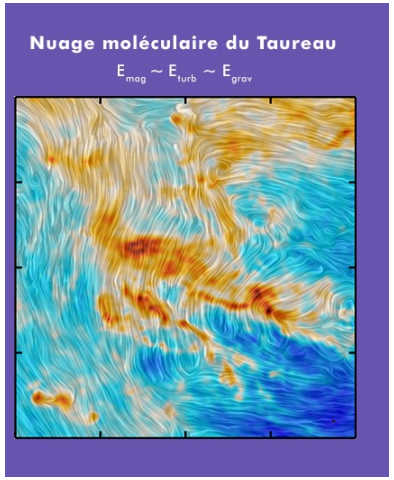


Le milieu interstellaire – les champs magnétiques

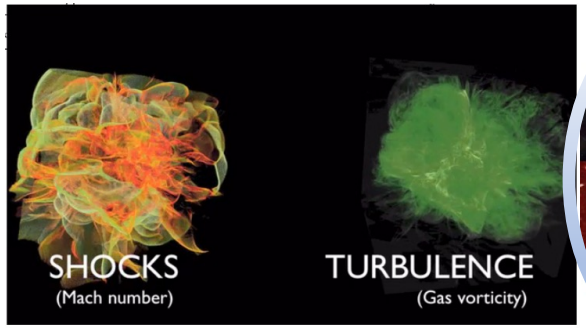


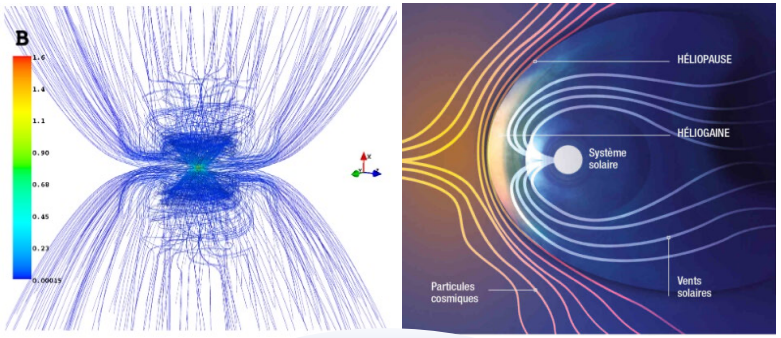
CR production

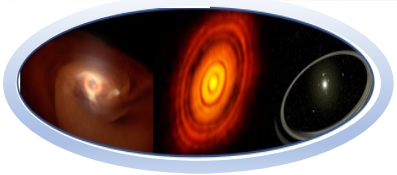


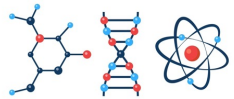


déplacements : thermique, non thermique (gravité, chocs, vents,..)
Ionisé par : photon, électrons, ions
Plasma turbulent (Re >>1) ! MHD



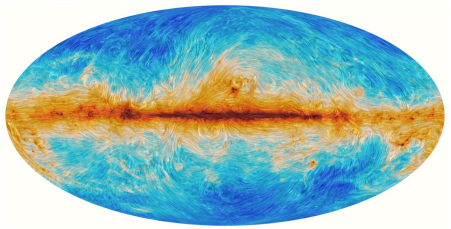






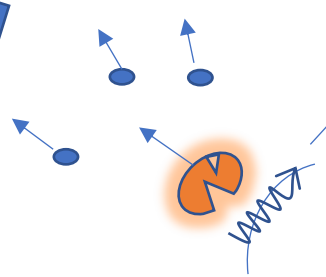
Le milieu interstellaire – les poussières (chargées)

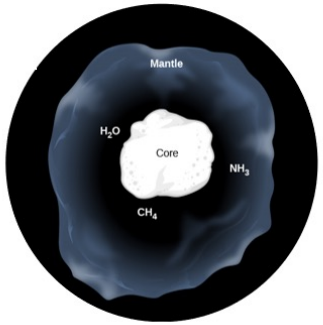
Refroidissement/chauffage radiatif



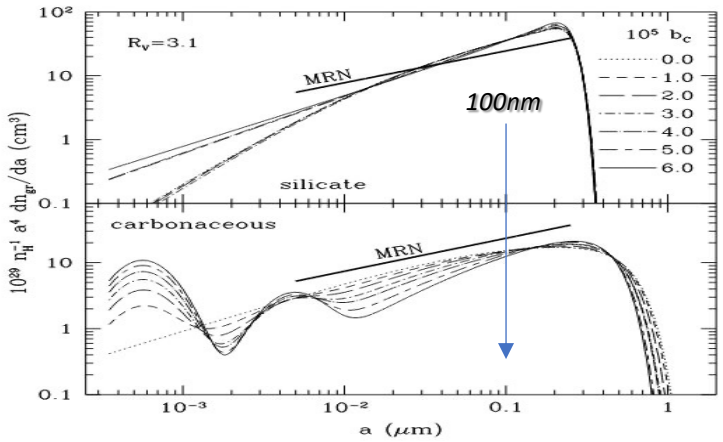
destruction/ redistribution

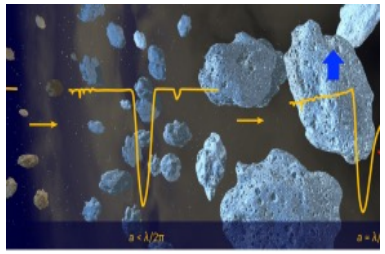
CR réfractaires

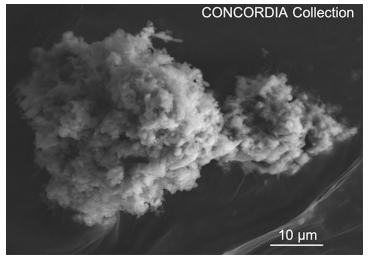




Nucléation des glaces (chimie complexe)
Régulation du degré d'ionisation



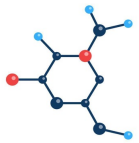


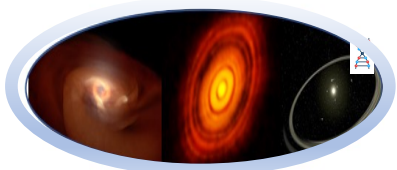


production

Si(Fe)

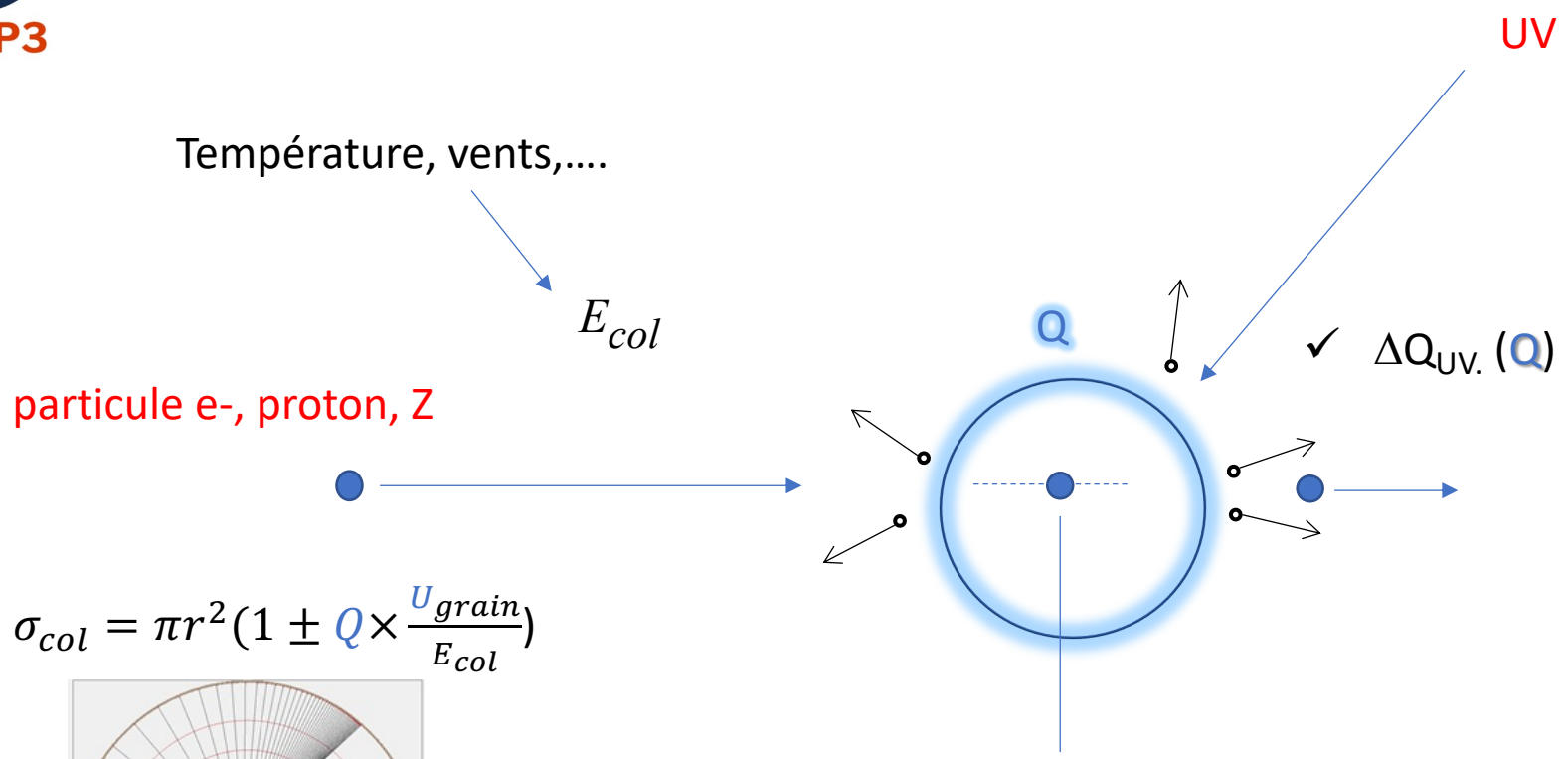
a-CH



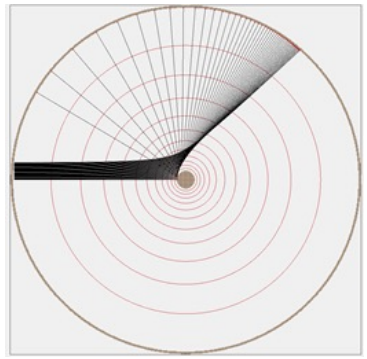


Coagulation (la terre est un tas de poussière !)

Le microphysique de la charge des poussières Q



$$\sigma_{col} = \pi r^2 (1 \pm Q \times \frac{U_{grain}}{E_{col}})$$



- ✓ Le proton (électron) s'arrête: $\Delta Q = +1$ (-1) ou il traverse: $\Delta Q = 0$.
- ✓ Des électrons sont émis par la surface $\Delta Q_{second.}(Q) > 0$.

Le Dispositif NanoCR@Andromède: la collision unique entre un ion et une poussière

Conclusions

- ✓ La charge des grains intervient dans de très nombreuses situation du milieu interstellaire
- ✓ Consigner des valeurs expérimentales afin de « cadrer » certaines des estimations astrophysiques peut être utile pour réaliser des calculs quantitatifs.
- ✓ NanoCR@Andromède : un dispositif pour étudier les grains libres