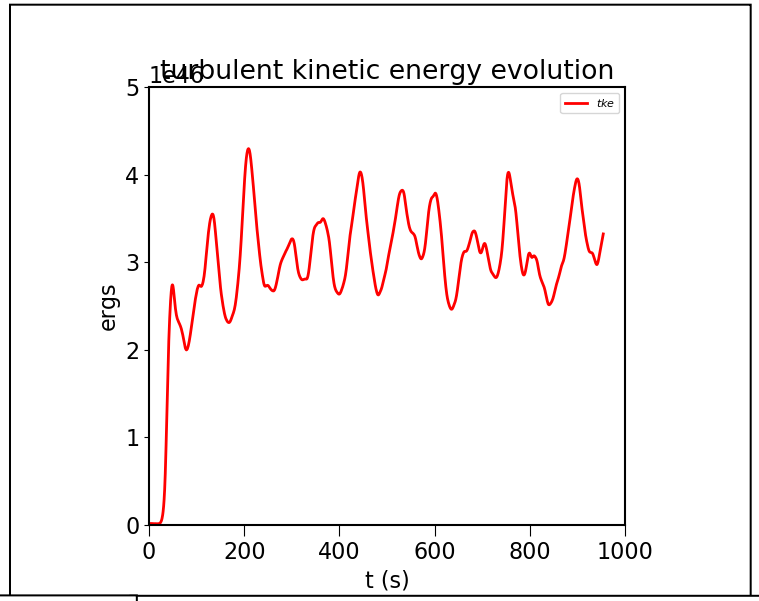
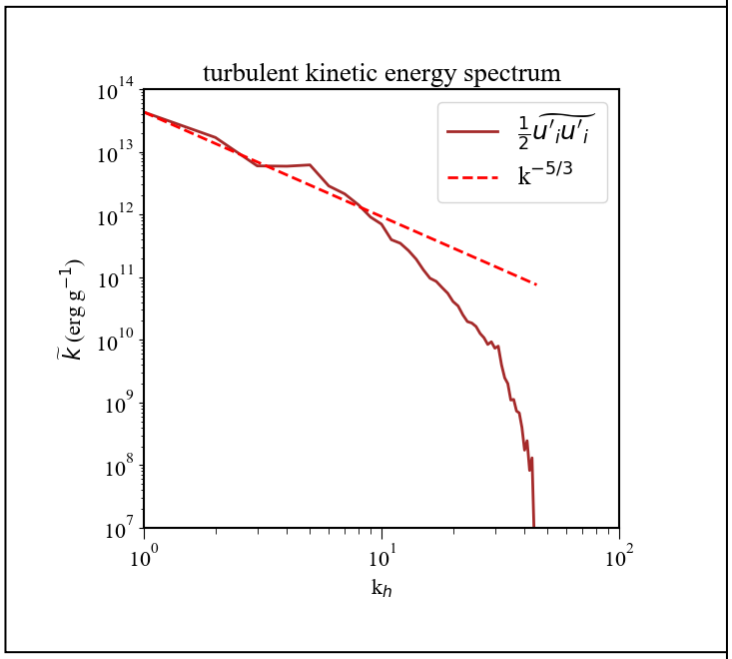
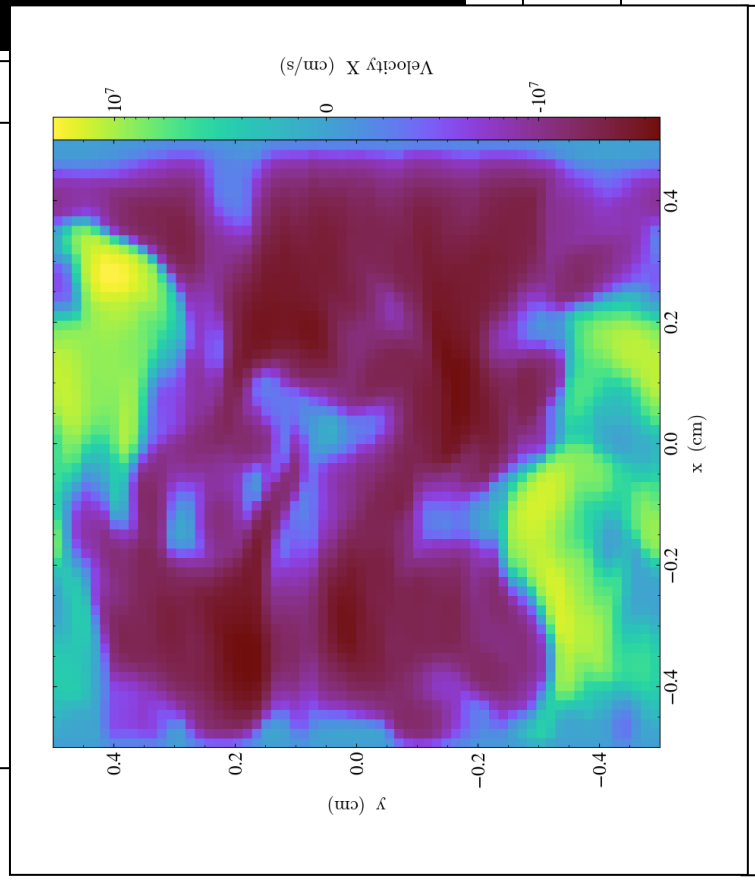
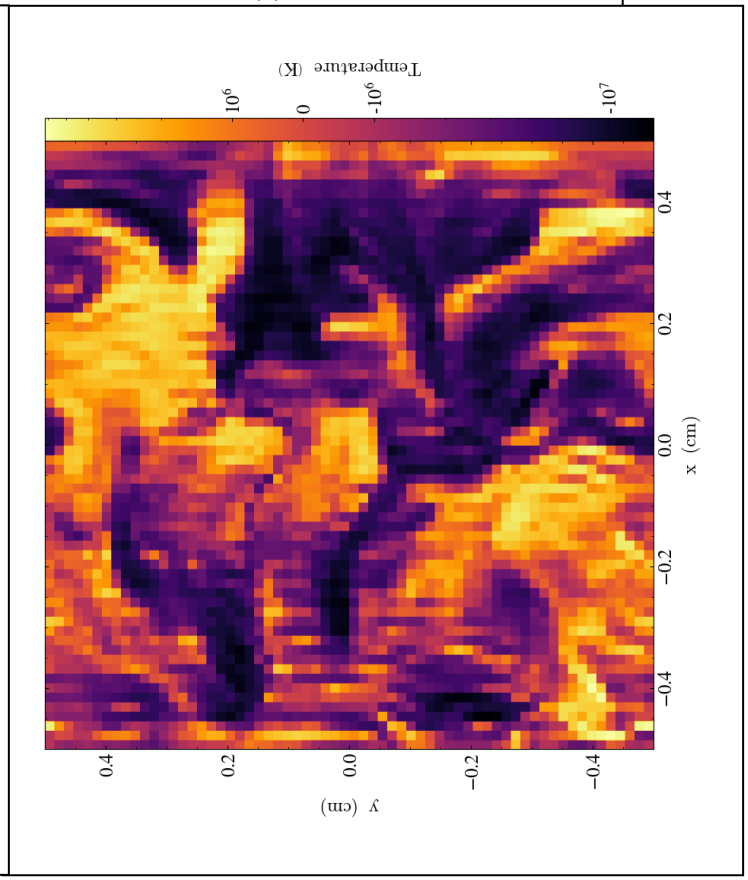
CCP one layer (64 cubed)

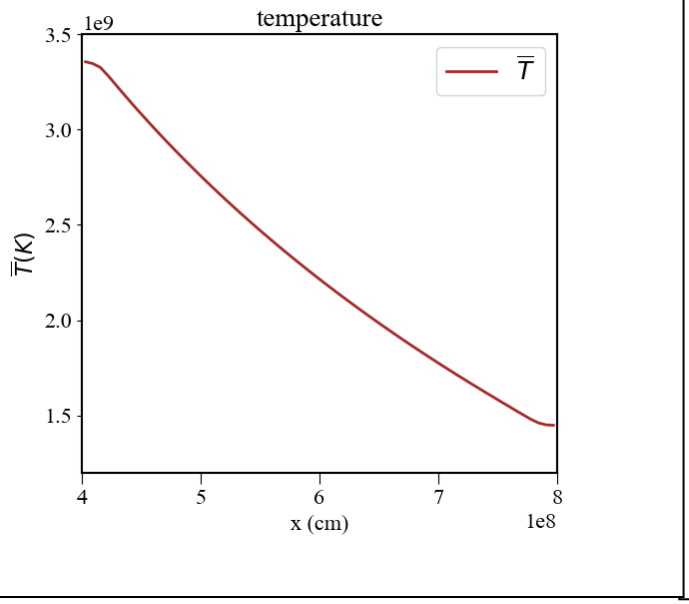
```
In [5]: run ransX.py
#-------------------------------------------------#
('Datafile with space-time averages: ', 'DATA/TSERIES/tseries_ccpone_64cubed.npy')
('Central time (in s): ', 611.0)
('Averaging windows (in s): ', 600.0)
('Time range (in s from-to): ', 300.0, 957.0)
---------------
Resolution: 64 64 64
Radial size of computational domain (in cm): 4.03e+08 7.97e+08
Radial size of convection zone (in cm):  4.03e+08 7.91e+08
Extent of convection zone (in Hp): 2.066258
Averaging time window (in s): 600.000000
RMS velocities in convection zone (in cm/s):  1.27e+07
Convective turnover timescale (in s)  6.08e+01
P_turb o P_gas 8.39e-04
Dissipation length scale (in cm): 5.61e+08
Total nuclear luminosity (in erg/s): -3.98e+45
Rate of TKE dissipation (in erg/s): 1.48e+45
Dissipation timescale for TKE (in s): 22.038489
Reynolds number: 245
```

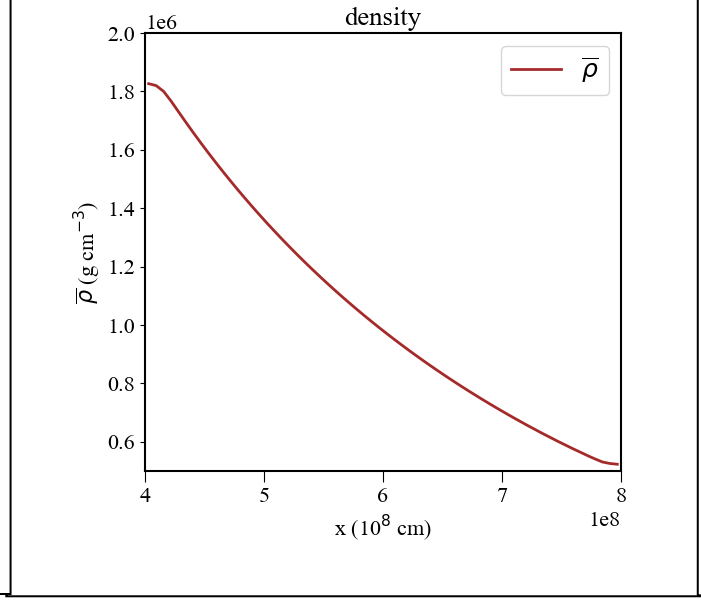


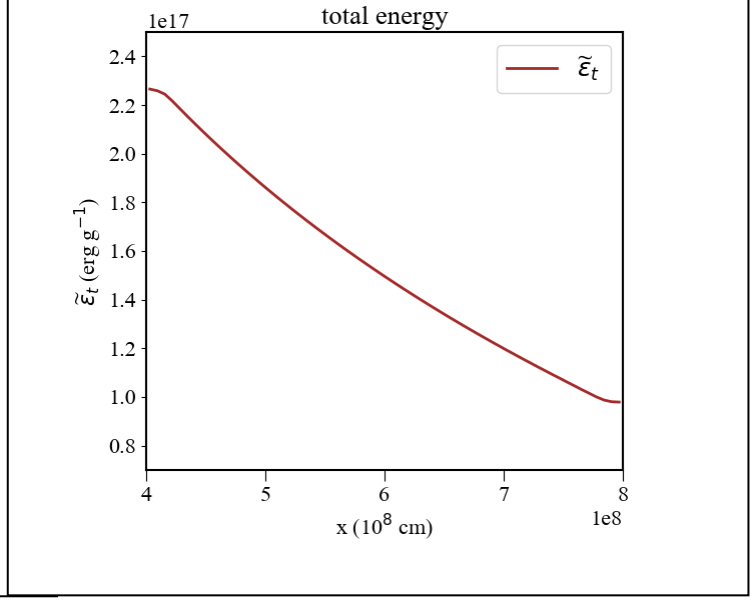


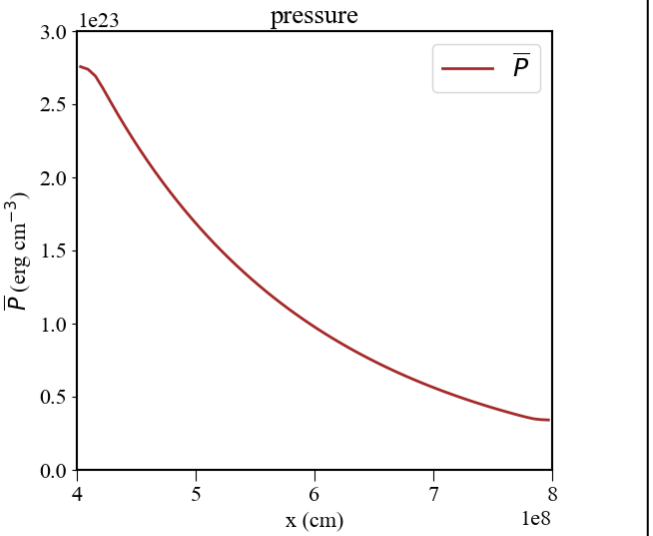


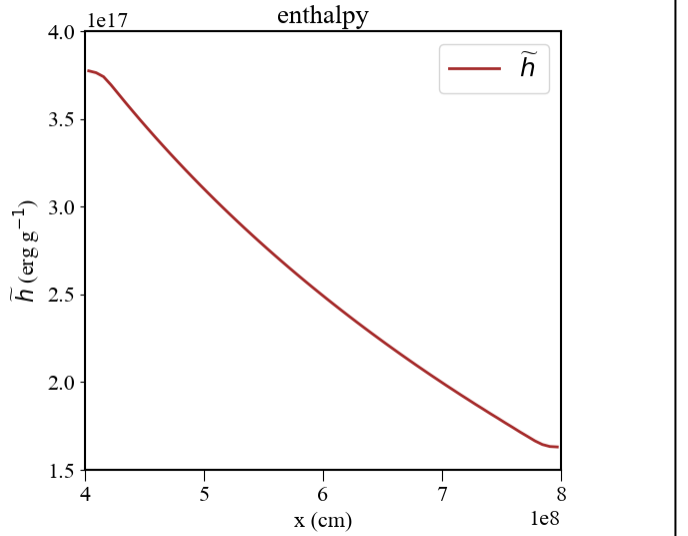


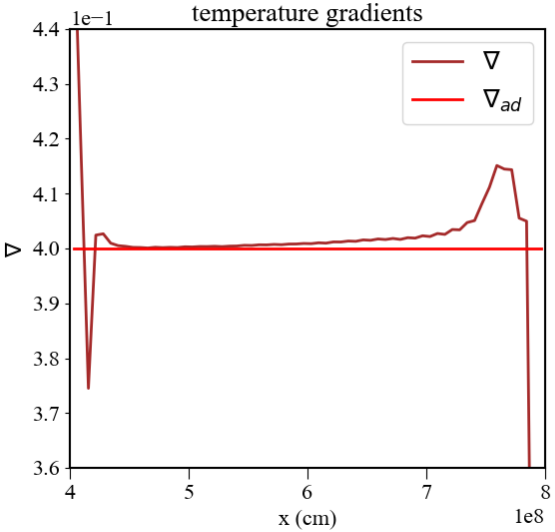




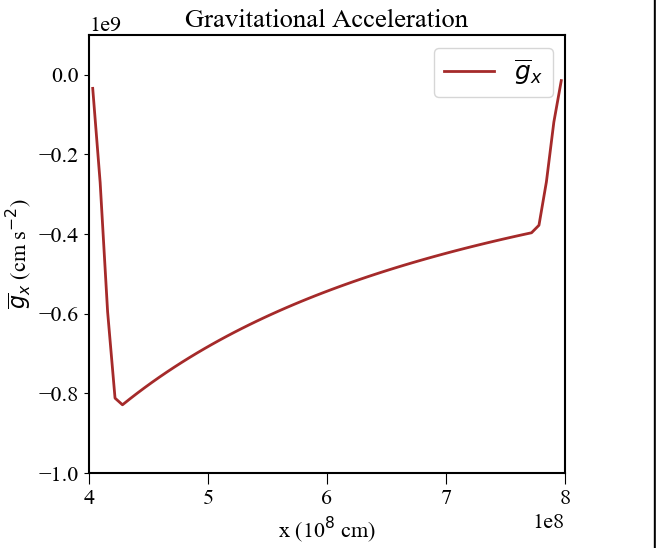


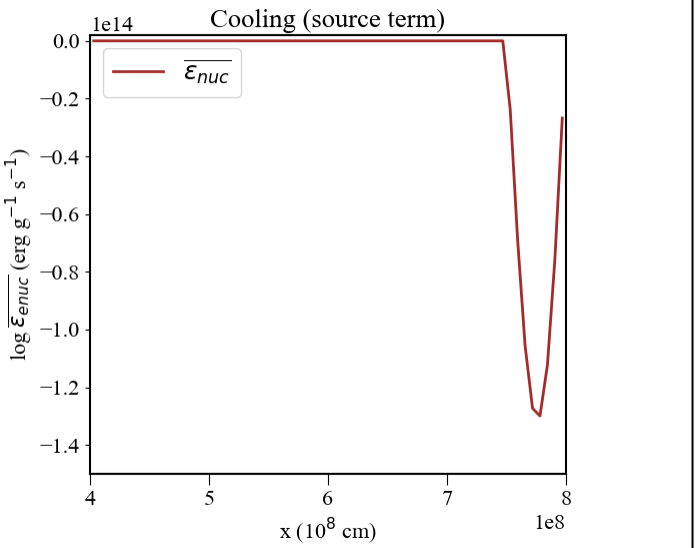


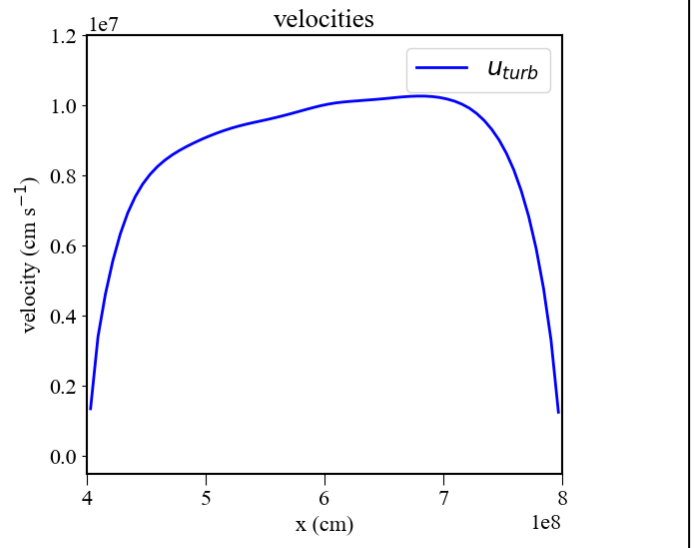


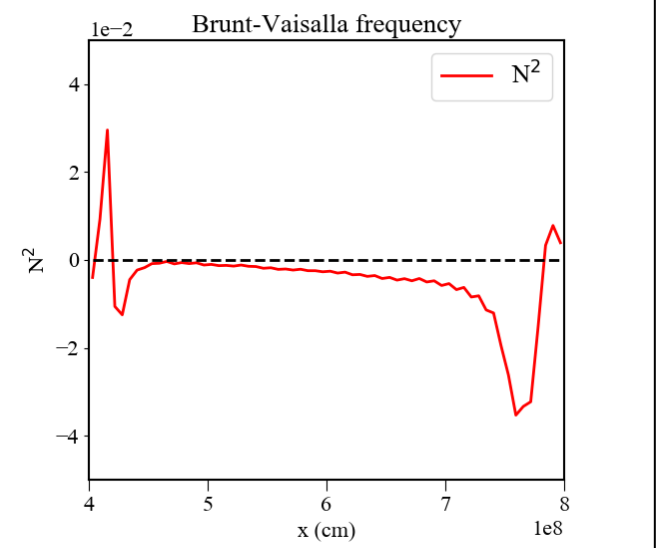


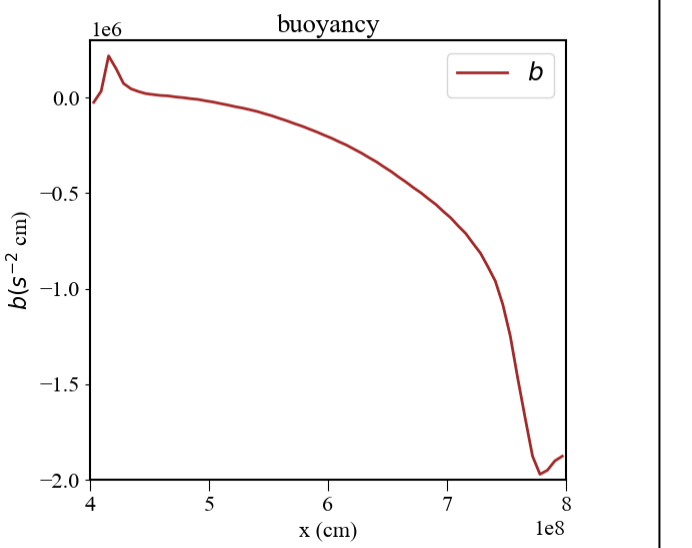
https://github.com/mmicromegas/ransX/tree/ransX_development

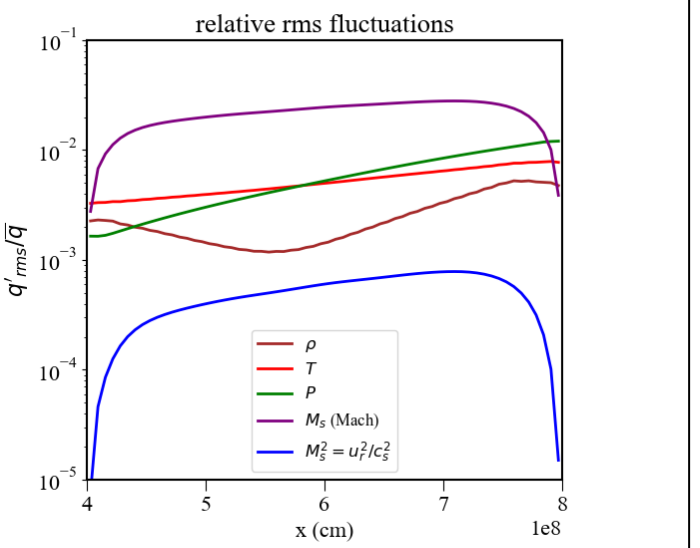

Gravitational Acceleration
1e9
$\overline{g}_x$
$\overline{g}_x$ (cm s^{-2})
x (10^8 cm)
1e8

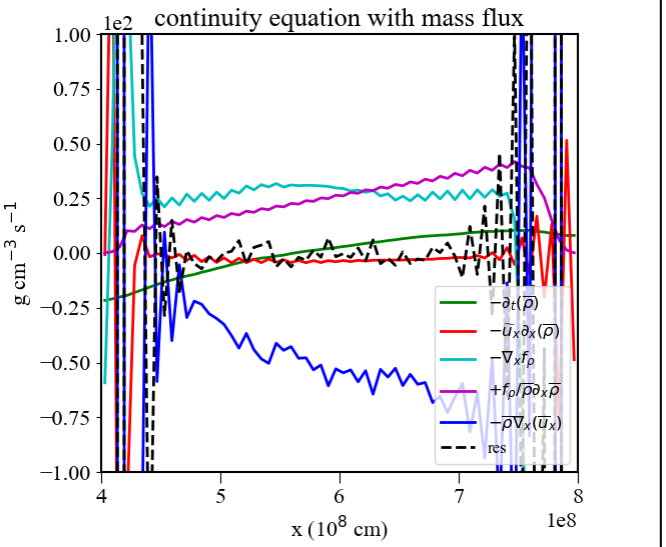

Cooling (source term)
1e14
$\overline{\varepsilon_{nuc}}$
log $\overline{\varepsilon_{enuc}}$ (erg g^{-1} s^{-1})
x (10^8 cm)
1e8

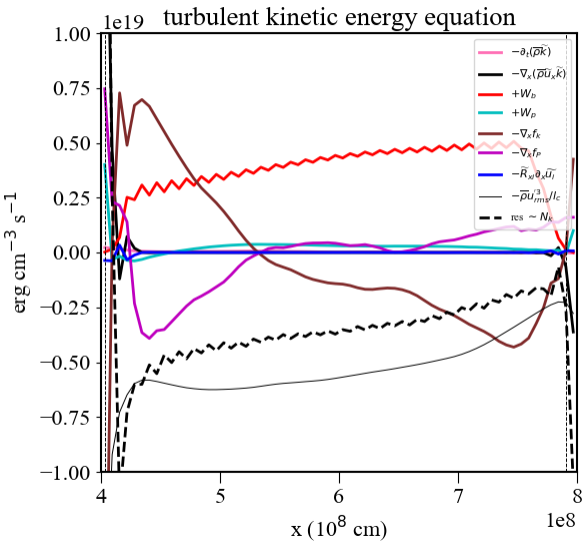

velocities
1e7
u_{turb}
velocity (cm s^{-1})
x (cm)
1e8

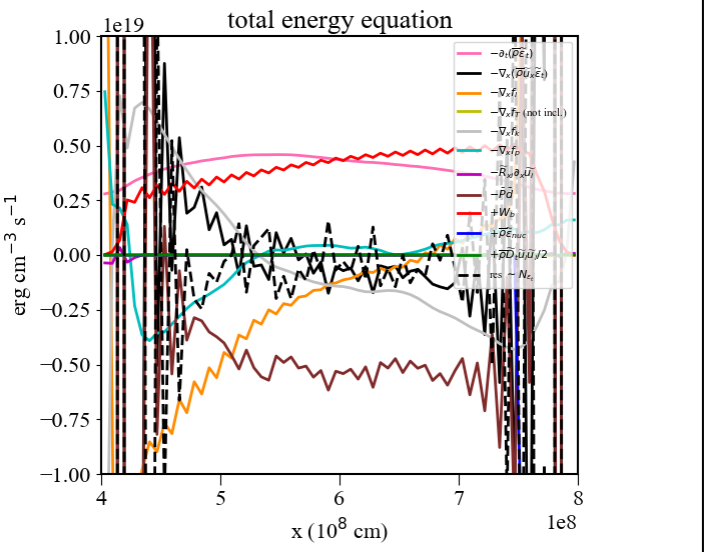

Brunt-Vaisalla frequency
1e−2
N^2
N^2
x (cm)
1e8

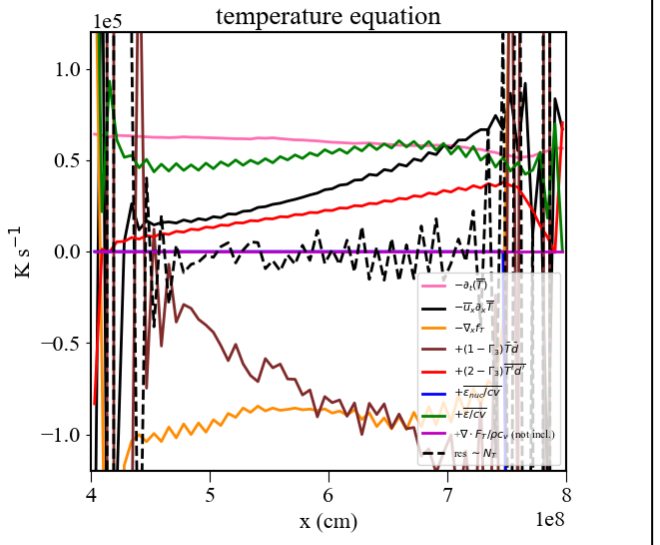

buoyancy
1e6
b
b(s^{-2} cm)
x (cm)
1e8

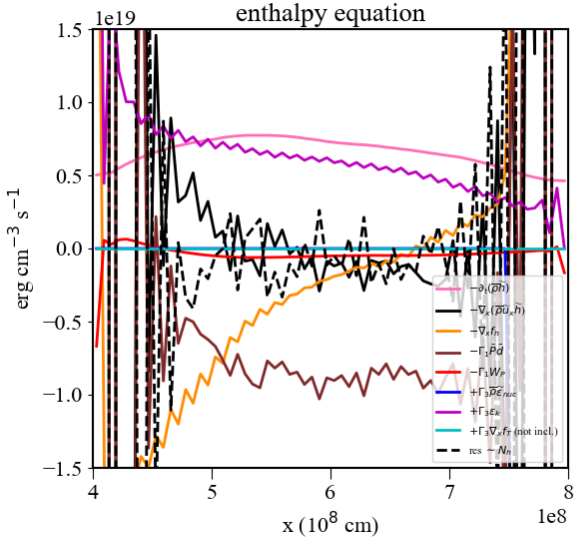

relative rms fluctuations
ρ
T
P
M_s (Mach)
$M_s^2 = u_t^2/c_s^2$
$q'_{rms}/\overline{q}$
x (cm)
1e8

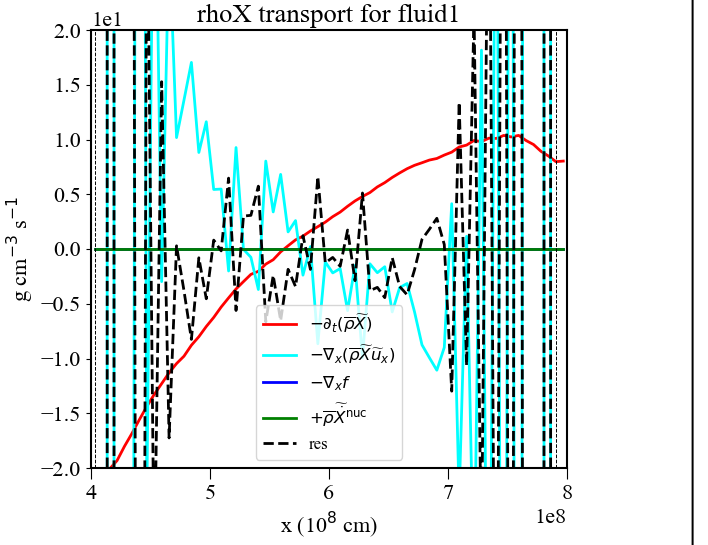

continuity equation with mass flux
1e2
g cm^{-3} s^{-1}
x (10^8 cm)
1e8
$-\partial_t(\overline{\rho})$
$-\overline{u}_x\partial_x(\overline{\rho})$
$-\nabla_x\overline{f}_\rho$
$+\overline{f}_\rho/\overline{\rho}\partial_x\overline{\rho}$
$-\overline{\rho}\nabla_x(\overline{u}_x)$
res


turbulent kinetic energy equation
1e19
erg cm^{-3} s^{-1}
x (10^8 cm)
1e8
$-\partial_t(\overline{\rho}\widetilde{k})$
$-\nabla_x(\overline{\rho}\overline{u}_x\widetilde{k})$
$+W_b$
$+W_p$
$-\nabla_x f_k$
$-\nabla_x f_p$
$-\widetilde{R}_{xi}\partial_x\widetilde{u}_i$
$-\overline{\rho}\overline{\varepsilon}^{3}_{rms}/l_c$
res ~ N_k


total energy equation
1e19
erg cm^{-3} s^{-1}
x (10^8 cm)
1e8
$-\partial_t(\overline{\rho}\widetilde{E}_t)$
$-\nabla_x(\overline{\rho}\overline{u}_x\widetilde{E}_t)$
$-\nabla_x f_t$
$-\nabla_x f_T$ (not incl.)
$-\nabla_x f_k$
$-\nabla_x f_p$
$-\widetilde{R}_{xi}\partial_x\widetilde{u}_i$
$-\overline{p}\overline{d}$
$+W_b$
$+\overline{\rho}\overline{\varepsilon}_{nuc}$
$+\overline{\rho}\overline{D}_t\overline{u}_i\overline{u}_i/2$
res ~ N_{ε_t}


temperature equation
1e5
K s^{-1}
x (cm)
1e8
$-\partial_t(\overline{T})$
$-\overline{u}_x\partial_x\overline{T}$
$-\nabla_x f_T$
$+(1-\Gamma_3)\overline{T}\overline{d}$
$+(2-\Gamma_3)\overline{T}\overline{d}$
$+\overline{\varepsilon}_{nuc}/\overline{cv}$
$+\overline{\varepsilon}/\overline{cv}$
$-\nabla\cdot F_T/\rho c_v$ (not incl.)
res ~ N_T


enthalpy equation
1e19
erg cm^{-3} s^{-1}
x (10^8 cm)
1e8
$-\partial_t(\overline{\rho}\widetilde{h})$
$-\nabla_x(\overline{\rho}\overline{u}_x\widetilde{h})$
$-\nabla_x f_h$
$-\Gamma_1\overline{p}\overline{d}$
$-\Gamma_1 W_p$
$+\Gamma_3\overline{\rho}\overline{\varepsilon}_{nuc}$
$+\Gamma_3\varepsilon_k$
$+\Gamma_3\nabla_x f_T$ (not incl.)
res ~ N_h


rhoX transport for fluid1
1e1
g cm^{-3} s^{-1}
x (10^8 cm)
1e8
$-\partial_t(\overline{\rho}\widetilde{X})$
$-\nabla_x(\overline{\rho}\widetilde{X}\widetilde{u}_x)$
$-\nabla_x f$
$+\overline{\rho}\widetilde{X}^{\rm nuc}$
res