Adiabatic photoevaporation flow

Bernoulli equation : $\frac{1}{2}v^2 + W = \text{Constant}$

"W is what Landau & Lifshitz use. Whereas Shu uses h

$$\text{Enthalpy, } W = \begin{cases} \text{ISOTHERMAL} & c_s^2 \ln \rho/\rho_0 \equiv W_\infty \\ \text{ADIABATIC} & \left(\frac{\gamma}{\gamma-1}\right) c_0^2 \left[\left(\frac{\rho}{\rho_0}\right)^{\gamma-1} - 1\right] \equiv W_\gamma \end{cases}$$

$$h = \int_{\rho_0}^{\rho} \frac{dP}{\rho}$$

So

ρ/ρ_0	v/c_0	W_∞/c_0^2	v/c_0	$W_{5/3}/c_0^2$	T/T_0	$W_{4/3}/c_0^2$	$W_{1.1}/c_0^2$
1	1	0	1	0	1	0	0
0.5	1.55	−0.7	1.68	−0.92	0.63	−0.82	−0.73
0.1	2.36	−2.3	2.22	−1.96	0.22	−2.14	−2.26
0.01	3.19	−4.6	2.41	−2.4	0.05	−3.14	−4.06
0		−∞	2.45	−2.5	0	−4	−11

So in the adiabatic case, the velocity increase is limited, even as $\rho \to 0$.

$$\frac{1}{2}v^2 - 2.5c_0^2 = \frac{1}{2}c_0^2 \Rightarrow v^2 = 6c_0^2$$

$$\Rightarrow v = 2.45\, c_0$$

$$\frac{T}{T_0} = \left(\frac{\rho}{\rho_0}\right)^{\gamma-1}$$

So T falls to 500K when ρ falls by 108 in case of $\gamma = 5/3$.

This will also affect calculation of h_0 since α_B goes up as T goes down. Assuming $\alpha_B \propto T^{-1}$ then we will have $\int n^{4/3}\, dr$ instead of $\int n^2 dr$

So, for instance at constant velocity we would have

$\int_1^\infty x^{-8/3} dx$ instead of $\int_1^\infty x^{-4} dx = -\frac{1}{3}\left[x^{-3}\right]_1^\infty = \frac{1}{3}$

$= \frac{3}{5}$, so it nearly doubles the value of h_0