Sigma_v Esipova

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$$\langle \beta v \rangle = \frac{2\Gamma\left(2-\frac{\beta}{2}\right)}{2^{\frac{\beta-1}{2}}\sqrt{\pi}} \beta_0 \left(\frac{M}{T_a}\right)^{\frac{\beta-1}{2}}$$

$$\beta_0 = \left(\frac{32\pi}{3\sqrt{3}} \frac{d_H^3}{M^2}\right) \frac{u(v^{-1})}{v^2}$$

$$\frac{dm}{dt} = -n^2 \langle \beta v \rangle$$

$$\frac{dr}{dt} = \langle \beta v \rangle \frac{r^2 S}{HT}$$

$\beta = 2.$

$$= \frac{r^2 (2\pi^2 g_s) T^3}{HT \, 45} \cdot A \frac{2\Gamma\left(2-\frac{\beta}{2}\right)}{2^{\frac{\beta-1}{2}}\sqrt{\pi}} \left(\frac{M}{T_a}\right)^{\frac{\beta-1}{2}}$$

$$= \frac{r^2 T^2}{H} \left(\frac{2\pi^2 g_s}{45}\right) \frac{\left(M T_a\right)^{\frac{\beta-1}{2}}}{T^{\beta-1}} \frac{2\Gamma\left(2-\frac{\beta}{2}\right)}{2^{\frac{\beta-1}{2}}\sqrt{\pi}} =$$

$$= \frac{r^2 T^{3-\beta}}{H} \left(\frac{2\pi^2 g_s}{45}\right) \cdot \left(M T_a\right)^{\frac{\beta-1}{2}} \frac{2\Gamma\left(2-\frac{\beta}{2}\right)}{2^{\frac{\beta-1}{2}}\sqrt{\pi}} \beta_0$$

$$H = \begin{cases} \sqrt{\frac{4\pi^3 g_e}{45}} \frac{T^2}{m_{pl}} \\ \frac{2}{3 t_{BC}} \left(\frac{T}{2{,}7K}\right)^{3/2} \end{cases}$$

$$dr = D_\beta \frac{r^2}{T^{\beta+1}} = \begin{cases} D_{RD} \frac{r^2}{T^{\beta-1}} = \frac{r^2}{T^{\beta-1}} \left(\frac{\frac{2\pi^2 g_s}{45} \left(M T_a\right)^{\frac{\beta-1}{2}}}{\left(\frac{4\pi^3 g_e}{45}\right)^{1/2} \frac{1}{m_{pl}}} \frac{2\Gamma\left(2-\frac{\beta}{2}\right)}{2^{\frac{\beta-1}{2}}\sqrt{\pi}} = \sqrt{\frac{g_s^2}{45 g_e}} \frac{\Gamma\left(2-\frac{\beta}{2}\right)}{2^{\frac{\beta-1}{2}-1}} m_{pl} \beta_0 \right. \\ D_{MD} \frac{r^2}{T^{\beta-3/2}} = \frac{r^2}{T^{\beta-3/2}} \frac{\frac{2\pi^2 g_s}{45} \cdot \left(M T_a\right)^{\frac{\beta-1}{2}}}{\frac{2}{3} \frac{1}{t_{BC}} \cdot \frac{1}{T_{BC}^{3/2}}} \frac{2\Gamma\left(2-\frac{\beta}{2}\right)}{2^{\frac{\beta-1}{2}}\sqrt{\pi}} \end{cases}$$

$$-d\frac{1}{r} = \begin{cases} D_{RD}^{-\frac{1}{\beta}} d\frac{1}{T^\beta} \\ D_{MD}^{-\frac{1}{\beta-1/2}} d\frac{1}{T^{\beta-1/2}} \end{cases} \Rightarrow \quad \frac{1}{r} + C = \begin{cases} \frac{D_{RD}}{\beta} \frac{1}{T^\beta} \\ \frac{D_{MD}}{\beta-1/2} \frac{1}{T^{\beta-1/2}} \end{cases}$$

$$\frac{1}{r} - \frac{1}{r_0} = \begin{cases} \frac{D_{RD}}{\beta} \left(\frac{1}{T^\beta} - \frac{1}{T_0^\beta}\right) \\ \frac{D_{MD}}{\beta-1/2} \left(\frac{1}{T^{\beta-1/2}} - \frac{1}{T_0^{\beta-1/2}}\right) \end{cases}$$

$$r(T) = r_0 \begin{cases} \frac{1}{1 + \frac{D r_0^2}{\beta}(\ldots)} \\ \frac{1}{1 + \frac{D r_0^2}{\beta-1/2}(\ldots)} \end{cases}$$

$$r = \left(\frac{1}{r_0} + \frac{D_\beta}{\beta_S} \left(\frac{1}{T^\beta} - \frac{1}{T_0^\beta}\right)\right)^{-1}$$

$$D_{RD} = D_{MD} \sqrt{\Gamma_{RM}} = \frac{\Gamma\left(2-\frac{\beta}{2}\right) g_s}{2^{\frac{\beta-3}{2}} \sqrt{45 g_e}} \beta_0 m_{pl} \left(M T_{eq}\right)^{\frac{\beta-1}{2}}$$

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$$r = \frac{r_0}{1 + \frac{D_\beta r_0}{\beta_S} \left(\frac{1}{T^\beta} - \frac{1}{T_0^\beta}\right)}$$