



## Erratum to: Entropy of self-gravitating anisotropic matter

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1. The Eq. (45) should read

$$s = s_0 \rho^{1 - \frac{1}{2w_2}} r^{-\frac{1+w_2}{w_2}} \sqrt{\frac{1-2m/r}{1-2\bar{m}/r}}, \quad (1)$$

where  $\bar{m} = m - M$ .

2. Contrary to the Lagrangian (37) which is deduced from the first principle, there is no guarantee that the trial Lagrangian (39) represents the true entropy for  $w_1 = -1$  although it matches well for  $w_1 \neq -1$  cases.

The Lagrangian corresponding to  $a, b$  in Eq. (44) is

$$\mathcal{L} \propto (\bar{m}')^{1 - \frac{1}{2w_2}} r^{-1} / \sqrt{1 - 2\bar{m}/r}. \quad (2)$$

However, if the solutions are analytic around  $w_1 = -1$ , the  $w_1 \rightarrow -1$  limit of the Lagrangian (37) gives

$$\lim_{w_1 \rightarrow -1} \mathcal{L} \propto (m')^{1 - \frac{1}{2w_2}} r^{-1}, \quad (3)$$

which is different from the above Lagrangian. Thus, one should be cautious in using the entropy density for  $w_1 = -1$ .

Therefore, the exact form of the entropy density for  $w_1 = -1$  should be derived by taking  $w_1 \rightarrow -1$  limit of the entropy function Eq. (47). The entropy density so obtained has the form

$$s = s_0 \rho^{1 - \frac{1}{2w_2}} r^{-\frac{1+w_2}{w_2}} \sqrt{1 - 2m/r}. \quad (4)$$

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