$$A_t = \frac{\Delta S}{U_{Age}}$$

$$= \frac{1.380649\times10^{80} J/K - 1.380649\times10^{65} J/K}{13.8*10^{10} ly}$$

$$= 1.057498\times10^{53}\ kg\ m/(s^2 K)$$

Units and unit dimensions:

(kilogram meters per second squared kelvin difference)

$[mass]\ [length]\ [time]^{(-2)}\ [temperature\ difference]^{(-1)}$

(I also checked this equation with boltzmann constant units, and it still checks out)