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Modern physics rests on two pillars: general relativity (GR) and quantum theory (QT). Nuclear planetology [1] is a new research field, tightly constrained by a coupled ^{187}Re-^{232}Th-^{238}U systematics [2-6], which by means of nuclear astrophysics aims also at understanding the thermal evolution of Earth-like planets towards the end of their cooling period. In nuclear planetology, Earth-like planets are regarded as old (redshift z $>$15), down-cooled and differentiated black dwarfs (Fe-C BLD's), which are subjected to endoergic ^{56}Fe(γ,α)^{52}Cr (etc.) reactions (photodisintegration), (γ,n) or (γ,p) and fusion reactions like ^{12}C(α,γ)^{16}O. Beside of its surface temperature T_{eff} of its outer core surface, the Earth shows also striking similarity in volume V with old white dwarf stars. This major boundary condition for nuclear planetology can be described in terms of $V_{Earth} = V_{WD} = V_{const}$=4•$\pi$•$r^3$/3 $(r_{WD} \approx r_{Earth})$. However, in addition to the fact that Earth is habitable, the most obvious difference between a WD and the Earth is their density ρ (ρ=*m/V*; m mass, V volume): while a WD may contain $0.5M_O(M_O$= solar mass) per V_{const}, the mass of the Earth is only a tiny fraction of this, ≈3•10^{-6} M_O. Therefore, it is crucial to understand $\partial\rho$, or why m_{Earth}«m_{WD} for V_{const}. Here I argue that the application of principles constrained by the theory of relativity [7] may offer a possible answer to this question: it is generally accepted that mass is directly related to energy, E=m•c^2 (E energy; m mass; c velocity of light) or m=E/c^2. From m∼E we derive that any mass change can be described in terms of energy change [7]. Instead of ρ=*m/V* we may thus write ρ=E/c^2•V, and because of the special scenario $V_{Earth} = V_{WD} = V_{const}$ discussed here, the denominator of this equation becomes a constant term C=c^2•V_{const} =9.73•10^{37}m^{5}s^{-2}. From this it follows, that ρ=*E/C,* or ρ•C=E. Therefore, we arrive at ρ ∼E or, considering the evolution of the system over time t: $\partial\rho/\partial t \sim \partial E/\partial t$.Hence, it may be concluded that any density change $\partial\rho$ of an old stellar remnant towards a ≈3•10^{-6} M_O Earth-like planet is a measure for the system's energy change ∂E, which in the case of the binary Earth-Moon-system is mainly caused by gravitational waves and core collapse. Taking evidence from rocks and meteorites into account, it is therefore suggested to constrain planetary evolution in general by means of GR and QT.

[1] Roller (2015), Abstract T34B-0407, AGU Spring Meeting 2015. [2] Roller (2015), *Goldschmidt Conf. Abstr.* **25**, 2672. [3] Roller (2016), *Goldschmidt Conf. Abstr.* **26**, 2642. [4] Roller (2016), *JPS Conf. Proc., Nuclei in the Cosmos (NIC XIV), subm., Abstr. #1570244284.* [5] Roller (2016), *JPS Conf. Proc., Nuclei in the Cosmos (NIC XIV) subm.; Abstr. #1570244285).* [6] Roller (2016), *JPS Conf. Proc., Nuclei in the Cosmos (NIC XIV), subm. ; Abstr. #1570244281.* [7] Einstein (1905), *Annalen d. Physik*, **18**, 639-641.