I present a review of recent works devoted to the space-time variation of the fine structure constant alpha, strong interaction and fundamental masses. New results based on the quasar absorption spectra provide evidence for the variation of the fine structure constant alpha in space. The results for the direction and magnitude of the alpha gradient obtained using data from different telescopes are in agreement. Also, there are no contradictions with the results of different groups. The spatial variation can explain fine tuning of the fundamental constants which allows humans (and any life) to appear. We appeared in the area of the Universe where the values of the fundamental constants are consistent with our existence. The space-time variation of the fundamental constants is suggested by theories unifying gravity with other interactions. These astrophysical results may be used to predict the variation effects for atomic clocks where very accurate measurements have been performed recently. I also describe recent theoretical and experimental works on the nuclear clock based on the narrow UV (7 eV) transition between the ground and first excited states in $^{229}$Th nucleus. The effect of the fundamental constant variation in this transition may exceed the effects in atoms by several orders of magnitude. There are also enhanced effects in a number of atoms, ions and molecules.