Contribution ID: **36** Contribution code: **S4 High Energy and Particle Physics** Type: **Oral Presentation**

The Hubble tension problem with variation of the speed of light from Pantheon supernova dataset

Friday 24 June 2022 14:30 (15 minutes)

We investigate how the local and temporal variation in the speed of light may help alleviating the Hubble tension problem. The idea is motivated from the observed variation in the fine structure constant from spectra of quasar absorption systems which could potentially be caused by the change in the speed of light. To test the hypothesis, we use the data from Pantheon Supernova which contains 1,048 spectroscopically confirmed type Ia supernova within redshift range $0.01 < z < 2.3$. From our model, we find that the variation in the local speed of light $\Delta c/c = (-1.63 \pm 2.65) \times 10^{-5}$ and the temporal variation in the speed of light is $(1/c)(\mathrm{d}c/\mathrm{d}t) = (5.45 \pm 4.37) \times 10^{-20}$ year^{-1} which gives a slightly better constraint from any measurements to date. It is still inconclusive whether the data prefers larger or lower value of the speed of light in the past due to a large uncertainty. However, in all our models of variation in the speed of light, the Hubble tension problem is alleviated by having a lower value of H_0 at 69.84 ± 3.94 km s^{-1} Mpc^{-1} and $\sim 1\sigma - 2\sigma$ difference to the early-time value. Such a simple model has a potential leading to our better understanding of how the Hubble tension arises and our presumption to the laws of physics which may not hold true across the cosmic time.

Author: CHANTAVAT, Teeraparb (Naresuan University)

Presenter: CHANTAVAT, Teeraparb (Naresuan University)

Session Classification: S4 High Energy and Particle Physics

Track Classification: High Energy and Particle Physics