

Since ancient observations to present day astrophysics, distance determination has been one of the most important, fascinating and challenging goals in astronomy. Knowing distances is much more than just knowing the scale; it also means knowing the physical nature of objects in the universe, and each significant improvement in the accuracy of the distance scale opens whole new fields of astrophysical research.

After the detection of the accelerated expansion of the universe (Nobel prize 2011) the physical explanation of dark energy has become a major challenge for astronomy and physics. One way to constrain the physics behind dark energy requires an extremely accurate (1%) determination of the extragalactic distance scale and the Hubble constant H_0 .

We propose a novel method to calibrate very precisely brightness of Cepheids – currently the most important problem in measuring the Hubble constant empirically. Our results wil have strong impact on cosmology and many other fields of modern astrophysics.