Seminarium Astrofizyczne
wtorek 25.10.2016 godz. 12:30
Hoża 69 pawilon sala 22

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Variability of MgII line in quasars as one step to understand dark energy properties

The Universe day after day give us more discoveries and even more surprises. Current astronomical observations indicate that the Universe consists in only 5% of the well-known matter, but in 95% of invisible and not understood substances: dark matter and dark energy. This last component is most difficult to understand. Dark energy acts in the opposite way to gravitational attraction: it causes the acceleration of the universal expansion. This conclusion is extremely peculiar. Precise and independent measurement methods of this effect are necessary to understand the nature of dark energy. Quasars are very luminous centers of active galaxies, which are observed from very large distances (wide range of redshift) and It turned out they are ideal candidates for this purpose. They are not standard candles, but their use is based on the determination of the absolute luminosity for each of them. This can be achieved by measuring the time delay between the variable nuclear continuum and the emission lines, as confirmed by the delay measurement of the Hbeta line done for nearby AGNs. The time delays in quasars are of the order of a few years, so the project requires sparse monitoring over an extended period of time. We monitor quasars at redshift z=1, which requires using the MgII line, and such monitoring has never been done before. The observations performed so far with SALT showed that we achieve the requested accuracy (below 2 per cent) of the MgII measurement to determine its variability, and the simulations indicate that the program can provide accuracy of 0.06-0.32 mag in the distance modulus for each single quasar.

Serdecznie zapraszam,
Agnieszka Majczyna