

Concluding remarks I.

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Short comments about some conference talks, concerning registration of GW signals, possible dark matter nature, SN 1a role in cosmology etc.

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The most important news, about Gravitational Wave detection on Earth, was reported by D. Rozinska. The signal with frequency around 100 Hz, detected by two Ligo instruments in USA, was related to merging of two massive black holes. Later the signal from two neutron star merging was detected by instruments, including Virgo in Europe.

An additional way to establish correlation between instruments LIGO, and VIRGO, could be transformation of each GW signal to the sound wave of the same frequency, and developing sound signals, like music.

Another fundamental problem is a search of Dark Matter nature, which is still unknown. Suggestion for multi quark particles, as candidate, is questionable, because they should interact by strong nuclear forces, what was not observed. Another discussed candidate, Dineutrino, should have problems with its formation, because the expected "kinetic" energy of neutrinos is much larger, than a weak interaction between them.

SN Ia are used for cosmology, in the search of dependence of the Hubble constant on time. It was noted, that SN Ia in galaxy clusters, and in field galaxies, could have, still hidden, systematic differences, what could create additional errors in results.

The interesting question was raised about the date of the beginning of the epoch of secondary ionization: is it started before, or after the period of main part of a large scale structure formation? The Gunn - Peterson type experiment for distant quasars was done for the quasar ULAS J134208.10 + 092838.61 (hereafter J1342 + 0928) at redshift $z = 7.54$, which was published almost a year after the conference [1]. It was shown there, that the Universe is significantly (but not fully) neutral at a redshift of 7.5, with ionisation level 0.5. We may expect therefore, that the large scale structure formation started after beginning of the secondary ionization.

Detection of precursors in some gamma ray bursts (GRB) was interpreted in the model of GRB - SN Ic connection. It was suggested that precursor appears from the neutrino induced weak explosion after collapse, and formation of rotating magnetized NS. The main GRB may be connected with a magneto-rotational explosion

A new solution for the old problem of a gravo-thermal catastrophe during the evolution of globular clusters was presented in the talk of M. Merafina. Using of the Boltzmann distribution function instead of the widely used King distribution, shifts the point of the onset of the gravo-thermal (thermodynamic) instability, which happens earlier, what better fits the observations. It is important for estimations of ages of globular clusters.

Let me also mention the question of Prof. R. Henry: how does the photon exist? I think that we still could believe in its classical (quantum) interpretation. F. Giovannelli have expressed doubts about correctness of rapidly increasing importance of formal criteria of science quality: number of citations, and Hirsh indices, what transform science into business, based on money, not on brains.

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References

- [1] Eduardo Banados, Bram P. Venemans, Chiara Mazzucchelli, et al. *Nature* **553** (2018) 473.