Low Latency Alerts and Multi-messenger astronomy – Nial Tanvir

An issue I'd like to highlight is the challenge of coordination between facilities, collaborations and funding agencies. Multi-messenger astrophysics, above all, requires uniquely close involvement of multiple facilities and real-time communication, and therefore benefits from efficient coordination operationally, but in the longer run, also "joined up thinking" in terms of funding and designing future facilities and infrastructure. This should push us, at least to some extent, towards a change of mindset from bottom-up (how can we best work with what we have) to top-down (what infrastructure and facilities will be required to exploit MMA in the future).

Perhaps the most critical issue is that of persuading funding agencies to support development of, for example, new satellite missions for which a major part of the science case is MMA. Such missions have a very long lead-time (~decade), but the other facilities with which they will coordinate cannot be guaranteed, e.g. because they are also not yet built, or because time is awarded competitively. Again, a change of mind-set is required if we are to realise the promise of MMA.

Similarly important "meta-problems" are how to work efficiently and fairly together within and between large (and small) collaborations. Internal operation is hard enough, but there are now well-established models, not least that of LVK itself. Ways of working externally, between collaborations is an important part of the whole project life-cycle, and in particular for low-latency. Some marriages have been increasingly forced on us, and we have models from transient astrophysics that have enjoyed good success (e.g. GCN system), but has not been without pain (e.g. writing the primary MMA paper on GW170817!), and paths forward are still not clear, particularly in an era where rates will be higher.