5 Feb 2007

Dear Friends,

On behalf on the Indian Association of General Relativity and Gravitation, it gives me great pleasure to welcome you to the 24th meeting of IAGRG. It is also an honor for us to be hosted at this new Center of Theoretical Physics of the Jamia Millia Islamia University. On behalf on all the members of IAGRG, I wish the Center a scientifically active and productive future.

The IAGRG has come a long way since its inception in 1969. Much has changed in the nature of our subject that has moved it from being a quiet backwater of physics to a busy port of call for pioneer expeditions. Internationally, the GRG meetings now attract a fair number of experimenters and active frontiers include applications to cosmology and astrophysics. Traditional areas like mathematical relativity share space with Numerical Relativity and quantum gravity includes researchers from High energy Physics and String theory. The American Physical Society now has a topical group in Gravitation.

Has the IAGRG kept up with the times? Do we have a vigorous presense in these frontier research areas or a marginal presense at best? This is a question I would like to pose and request members to introspect about so that during the General Body meeting we can delibrate on it and decide on what we can to improve the situation.

Another related point of concern is our presense and effectiveness relative to other subfields of physics. Both the condensed matter community and the high energy physics community are more visible, proactive and effective. The astronomy and astrophysics community with whom we share some common interests are also better organized. (As an aside the least we can do is avoid having our annual meetings in the same week!) They attract the best of students and have been able to sustainably run graduate level schools over many years given their larger numbers. They also have reasonably strong experimental or observational initiatives. Does our subject have the influence it merits? Can our subfield really make an impact with such limited presense? What can we do to remedy this? Or should we remedy it at all!

Among the many reasons a possible one could be the lack of exposure of young students and researchers to opportunities in our subject. To address this our Secretary Shyam Date and I decided to update the Webpages of IAGRG to reflect the myriad connections of GR to research today and the pedagogic material available on the net in these areas. Shyam has set this up and I would like to thank him on behalf of all of us. He will give more details in his report. I am sure more can be done. Can we host Chat rooms or Discussion groups on special topics? Can we help centers with lesser number of researchers by Broadcasting Seminars on the Net? Could we request IUCAA to explore setting up such programs? Should we revive Gurutva, the IAGRG newsletter that we had for some time, in a Web-Only version on the lines of Matters of Gravity so that the GR community feels more connected? Would having a repository of web-versions of GR courses and seminars help? Let us see if we can arrive at a consensus on some of these matters by the General Body Meeting and then examine how best to implement it.

I now change track and next recall a historical note in the area of GW, the topic of my technical presidential address to illustrate a point. The issue relates to Einstein and his view on whether GW exist??

- Maxwell (1864) had talked of GW. Poincare (1908) discussed possibility of planets losing energy by GW.. Laplace (1776) examined orbital damping arising from finite speed of gravity for Moon
- 1916: In the paper exploring physical implications of GTR, Einstein proposed existence of GW as one of its important consequences
- 1918: Einstein calculated flux of energy far from source (Quadrupole Formula) ..Radiation Reaction ..Radiation Damping
- 1922: Eddington: Corrected factor of 2 in AE's work, pointed inapplicability of AE's derivation for self gravitating systems. He said GW propagate at speed of thought! Raising doubts that solutions corresponding to GW's could be mere coordinate effects!
- Appears AE wished to forget he had predicted GW. Doubts about physical reality (gauge independence of GW).
- Remember his job at the patent office required him to be critical of novel ideas and so he had a reasonable judgement about the slim chance

that GW might be detected based on even a Michelson Morley expt ($h \sim 10^{-9}$) and the then known stellar binaries. NS binaries were decades away

- 1936 AE's letter to Born

> Together with a young collaborator (Rosen), I arrived at the interesting result that GW do *not* exist, although they had been assumed a certainity to the first approximation. This shows that the non-linear general relativistic field equations can tell us more or, rather, limit us more than we believed up to now.

- Referring to paper submitted to *Physical Review* entitled 'Do Gravitational waves exist?'
- Paper returned with a *critical* referee's report
- Einstein dismissed referee's comments and withdrew the paper. He wrote
- 'We had sent you our manuscript for *publication* and not authorised you to show it to specialists before it is printed. I see no reason to address the - in any case erroneous - comments of your anonymous expert. On the basis of this incident, I prefer to publish the paper elsewhere'.
- Editor Tate regretted Einstein's decision to withdraw but stated he would not set aside the journal's review procedure.
- Einstein never published in Phy Rev again!
- Einstein submitted the paper to J of Franklin Institute, Philadelphia, with no changes!
- Work set out to look for exact soln of EFE to describe plane GW and found it was not possible to do so without introducing singularities in the metric describing the wave
- Robertson and Infeld - Discovered error ..Singularity could be avoided by constructing cylindrical wave soln so that offending singularity relegated to infinitely long central symm axis, where the material source is

- When the error was pointed out, Einstein concurred and completely revised it in the galley proofs!
- Rosen did not distinguish sufficiently between co-ordinate and physical singularities..(Recall earlier discussions of Schwarzschild singularity!)
- Landau Lifshiftz (1941) and Fock (1955) extended Quadrupole formula to weakly self-grav systems
- 1950 + Goldberg, Havas, Pirani, Bondi, Metzner, Sachs ..
  Mathematically precise discussion of Asymptotics in GR. Rigorous work that GW transfer energy!
  Feynman, Bondi..GW could in principle heat a suitably contrived mechanical system! GW are not gauge effects. They transfer energy.

The above incident reminds us that even our Gods are human and can occassionally err. What ensures our collective progress towards the truth are the traditions of peer review and accountability we collectively accept and individual integrity and uncompromising rigour we bring in its implementation.

I hope we have a productive scientific meeting both in sharing our research and more importantly exploring possible collaborations across institutions. I thank Prof. T.P. Singh and the SOC for putting together an interesting academic program. I thank Profs. Sami and Jhingan and the LOC for hosting the IAGRG and for all the arrangements. I thank all the speakers at this meeting. I also hope they will stay through the full meeting. To build up an effective community one must be willing to participate in meetings like this not only as speakers but also critical listeners. Thank you for your attention. I will now move on to my technical presentation.

Bala Iyer