

LIGO India meeting

Tuesday 24th April 2018, 9-10 UK (13:30-14:30 Pune, India)

Attending: Anil Prabhakar, Ed Daw, Giles Hammond, John Veitch, Liam Cunningham, Nils Andersson, Somak Raychaudhury, TIFR (Raji).

Giles: Meet regularly, every 2 weeks. Email list reminder. Next meeting Tuesday 8th May 9am UK

1. Collaboration agreement

Collaboration agreement, signed both in the UK and India. Spoken at LVC.

Action: Somak: to sign documents. His team was looking over it and will be signing it today.

2. Progress on GCRF spend/LIGO India spend

Giles: Newton Baha: 3 year grant , 2 years left. GCRF uplift: short term grant from STFC ~40k (to be spent by July 2018), 20k to laser stabilization set ups with Ed Daw/Anil Prabhakar. Some consumables spent on ion beam sputtering work-Stuart Reid. Silica stocks were purchased. Outreach – app development from Birmingham (Andreas Freise space time quest in Hindi) also Nils Andersson – book on GR, accessible for kids, 1000 copies have been ordered, printed and will be sent to India.

Nils Andersson: re the book: in Bangalore there will be a launch event in May.

Giles Hammond: suspension work, outreach & STEM, entrepreneurial- Stuart Reid and sources (Des Gibson and GSS)

GCRF spend needs to be invoiced and finalized by end of July. 20k GBP attempt to spend on Optics on THORLABS but having GU issues for spending, should be sorted within the next month.

3. Progress on visits to UK/new application for outreach

Visits to UK/India: Indian scientist into our UK lab and vice versa, open call- application form was sent. Needs to have justification of costs, visa, etc.

Raspberry Pi locking Michelson interferometer: From GU- involves students in computer science and programming. This would get kids into simple programming to python. Small enough that fits in a hand luggage. Info on slides attached to email sent 8:52am UK time 24/04/2018. Raspberry Pi controls the interferometer and also plays videos of LIGO, possibility of injecting signals into the system and some work with data analysis to do some match filtering, real life signal extraction. Make 4-5 version, 600-700 GBP each. Total 4-5k GBP.

Project approved

India: Somak Raychaudhury – need to think how to efficiently replicate the interferometer due to obtaining the materials, but thinks more appropriate for undergrad students due to the matching filtering. Giles Hammond: propose to build 4 systems and start using them in the India labs/schools.

TIFR- Raji: thinks could be implemented in India, raspberry Pi would be cheap, most expensive would be laser and piezo.

Giles Hammond: - Different levels for the interferometer, we've used interferometers with school kids and other outreach activities for wider communities such as science festivals. 4-5 would be sent to India. If India wants to make ~10 of these India needs to apply for form and use the grant to fund them.

-Build the interferometer within 6 weeks, have someone in the UK to go to India and think of the possible different age groups and see how it can be incorporated to the program.

4. UK meeting

Meeting INDIA-UK kick off: Somak Raychaudhury will be in the UK between the 6-9th of June in the UK for a different meeting. Martin Hendry has pointed out that following week is examiners week so might not be possible.

Somak Raychaudhury: Indian visas takes ~6 weeks and there might be issues with passports, May might be trickier. Maybe June/July be easier. Not think of meeting as a kick off but start the work.

Action: Liam Cunningham to extend poll into July (done)

Action on everyone: fill in the poll by this week

Ed Daw -suggest September due to restraints on obtaining the equipment.

Somak Raychadhury : Decouple the meetings and kick off meeting. Happy with 3 people from the India side, extend doodle poll for ~ 3 more weeks. Giles Hammond agreed this was a sensible strategy,

Giles Hammond: June 11th is possibly too tight due to visa applications. Keen to do before September due to STFC's request for a meeting. Doesn't have to be a kick off meeting but could be a end of year 2 meeting, end of June and into July. Will add dates until the end of July in the doodle poll.

Ed Daw: agrees with not having meeting on Sept.

Liam Cunningham: has added June and July into the doodle poll and will forward the doodle poll again.

Somak Raychaudhury: Full week needed? Giles Hammond: possible a 3 day meeting.

Item 5 . VR activities with OzGrav

Update: OzGrav, Australia: Done a lot of work on VR apps, they've been doing it for astronomy side, they have two systems one with a smart phone and you can project it through a box goggles and a full VR version which requires laptop camera and others which would allow you to be inside LIGO and walk around. For LIGO India they are very happy to share their development so Sanjit Mitra thinking how to link to LIGO India activities, perhaps with the smartphone and headset could work well. Will be exploring possibilities and have bought 20 headset. Thought was to send to India and/or have some in the UK and some in India and start testing in outreach activities with schools and see how it will work.

Somak Raychaudhury has used the cardboard headset in schools and works very well. ANU visited India recently in and they are seeking to strengthen ties with India.

Could be permanent exhibition, thinking of having science center around the area around LIGO India. This could be a high end VR system.

Action: Giles Hammond/Sanjit Mitra to take forward discussions with Ozgrav

6. Regular meeting slot time

Giles Hammond: Consider having a meeting every couple of weeks?

Somak Raychaudhury: Agrees would be good, same time would work well.

Giles Hammond: agrees, 9am UK and 1:30 pm India. time.

Meeting time: Tuesday, every two weeks, 9am UK, 1:30pm India time. Next meeting on 8th May 2018

UK needs to think about India visas as well. Both sides should apply for long term visas (5-10 years)

RRCAT/IPR -government institutions (Department of Atomic Energy: DAE). Start developing those links, STFC said they have contact with high levels in DAE. Somak Raychaudhury & Ed Daw will continue talks offline. Somak Raychaudhury thinks it could be possible to build out connections and start collaborations with them.

Action: Giles Hammond to initiate some links through STFC to RRCAT/IPR, copied to Somak Raychaudhury and Ed Daw.

Having links with the group in charge of developing the suspensions etc between UK and India would be good, and give opportunity to keep this project going. Showing that we've developed this community and links there is possibility for continuing this projects.

Meeting close: 10am UK