

15th of October, 9am UK time and 13:30 India.

Present:

Sukanta	Anil
Suresh	Ed
Manasa	Umakant
Nils	TCIS-TIFR(Raji and Karthik)
Somak	Giles
Sukanta	Jim
Stuart	Mariela

Giles: Hi everybody. The first item on the agenda is to quickly go through any updates from the work packages, I've pasted the link in the chat:

https://gilsay.physics.gla.ac.uk/dokuwiki/doku.php?id=ligo_india:start

1. Updates from the WP as per the wiki.

Giles: On WP1, It is important to have the reports especially for follow up funding, is good to have a follow report on what we have been doing. If there is any report please do send them along.

Giles: Regarding the portal for the India students, have we had any more thoughts on this?

Somak : we discussed here with Suresh and he agreed to work on this. After I went to this event in Chicago I met a group of people who ran a portal like this for the American, and they have a very establish program to take students from India to the US. Non profit organization and They work with the NSF as well as the Dtf to work for three months in the US. This is very similar to what we are planning to do as so we are in the process to see if we can set something with them as they already have a large group of people wanting to to go the US so the idea would be to widened this to include Europe and Australia. If this doesn't work then Suresh will deal with this but we should be able to give more accurate update on the next call.

Giles: Excellent. In terms of the other packages, we will be discussing these later on. Next item on the list is,

2. Update on ongoing projects/visits.

Stuart: We hosted Satyaki Sasmal last month at Strathclyde. Satyaki has been working with Karthik to set up a novel magnetron sputtering system in India, and came to learn about mechanical loss measurements. He helped our lab on the characterisation of zirconia-tantala films on silica cantilevers, and was helping us optimise the nodal support system for measuring silica disks. He also helped with the design and costings for the proposed Q measurement system, to be built in the UK and shipped to India.

Giles: Umakant have you been talking to Ed about the students coming over to Sheffield

Umakant: We have been looking at that because the initial attempts were very expensive but we've been looking at other cavities so once we know that then we can work

out the students. The most important thing to find is a shop to machine it and once we get the quotes for this then we can give the purchase order for this.

Giles: Thanks Umakant, have I missed any other potential visit? Anyone wanting to host a visit in the UK / India.

Nils: I have a visit right now which in retrospect could have asked for funds but we can talk about it offline.

Sukanta: In November there is a good reason to have visits in India, to IUCAA and others. And since Nils just said something about collabs between IUCAA and Northampton, there's a small group of experts meeting on numerical relativity at the end of this year. Perhaps this could be done at the same time as the data analysis meeting?

**3. Discussion on workshop on data analysis/entrepreneurship to set up date.
Preferred dates seem to be the week of the 28th Jan, 4th Feb and 11th Feb.**

Giles: These could run in parallel. Or we could have the numerical relativity first and then later on in Jan/Feb have the other workshops. Any thoughts on the dates?

Mariela: At the moment we have the dates I sent on the email Preferred dates seem to be the week of the 28th Jan, 4th Feb and 11th Feb. We've heard back from one person from Industry in the UK and they would be able to visit if this visit coincides with other visits they are planning for mid-January then that might work for them. We also want to make sure others in industry are involved in this, particularly on the India side, have we had any contact with them?

Sukanta: Somak facilitated such a meeting, we had a meeting with the high commissioner in Bombay recently. There were several trade related people and Somak and I were talking this morning so we are planning on inviting them to IUCAA and plan on how to get them to present in Jan/Feb/.

Somak: The meeting that Sukanta went to was a small meeting that I think some people of the UK came over and I think this small delegation might even include the prime minister coming over. I think they are waiting for us to give them some details such as the dates and the other is the kind of industry that we are interested in.

Giles: What sort of time frame are we talking?

Somak: The ball is in our court, so they've been brief about it we just need to let them know dates and in what capacity. It also depends on the scope of places we want to have involvement from.

Giles: That sounds excellent, I think it would be good to expand the scope as well. On the UK side, Industry seems happier with mid Jan and Feb.

Somak: In IUCAA I think the last week so the 28th of Jan. Is where we have a large meeting so I think our resources will be engaged in this. Other than that I think the dates that you mentioned should be alright. Many of us will go to the Astronomical society meeting.

Somak: Sukanta, Is there anything else that is being organized in the middle of Jan?

Sukanta: We are organizing a multi messenger meeting in Jan and we were thinking that it could work if this meeting followed after this, so the meeting is between Jan 15th-18.

Giles: OK thank you. Mariela and I will have a look at these and get back to you.

4. Discussion of projects.

Giles: GCRF uplift completely spent, we still have some funds available called the GCRF institutional awards 40K funds that need to be spent by the end of December. We opened up this call to ask for projects and we would consider in this meeting. We had three proposals from Stuart, Anil and Martin. Stuart would you like to go first?

1- Establishing thermal noise characterisation of optical coatings in India: This project will seek to build a custom UHV vacuum system for carrying out mechanical ringdown experiments on silica wafers suspended on a single nodal support (GeNS). This is important for the building of LIGO India, as improved thermal noise, associated with the laser mirror coatings, is required to reach the design sensitivity of the A+ interferometer configuration. This facility will enable better exploitation of the advanced thin film coating facilities within India, such as those hosted in Prof Karthik Raman's labs.

Stuart: Motivation is that there is strong interest in India for coatings research, with many labs and companies with thin film deposition capabilities. Since LIGO India will be built as an A+ detector, which requires lower thermal noise coatings, it makes sense to help develop relevant coating R&D in India, to partner with UK (and elsewhere) to help develop suitable coating technology. Given this synergy, we propose to build and commission a mechanical loss testbed in Strathclyde, to be shipped to India. The system will be capable of hosting four 3" fused silica wafers (which can have coatings applied) using a nodal support. Happy to take questions.

Umakant: Regarding this Q measurement system. A short update, since we are setting up this lab between IUCAA I had been looking at getting this machined and started here the problem is we might not have enough funds to do so.

Giles: We are talking about a design system or is there already well known that this works.

Stuart Reid: Is already well known. The only difference is that this will be a much more compact system and is therefore better designed to fit the samples that are preferred now. I think building parallel systems is a great idea.

Umakant: We can probably already start with the vacuum chamber and we can make two sets and then we will have two set ups.

Karthik: I was thinking we could share the design and with some inputs on our side and we are planning to start working on this using wafers and we will start with that. And then someone can visit from the UK. On a longer scale, if making cantilevers system we might need more training.

Giles: The budget 40k, and this would take about half of that budget, I quite like the idea of running systems in parallel. Say we couldn't give you 21k but only 15k, is this sort of the minimum we could do?

Stuart: We can't get it any lower than that, the only way we could reduce the cost is for example if the Indians have a spare pump then that would reduce the cost a lot as we wouldn't buy one from here and then ship to India.

Giles: I think that puts it in perspective, I think we should want to make a working system with new components. Can you confirm that this would be all completed and purchased by the end of the year?

Stuart: We should be able to purchase very quickly once the grant is approved.

Giles: Any more questions/comments?

Umakant: Imports costs to India, so if you think there are any components that could be purchased in India then that's something we could look at.

Stuart: We should definitely discuss this off line.

Giles: We need to explore for both this system and laser stabilization, re the VAT and how this will hit us. I see positive thoughts on this though.

2- To build a UG lab Michelson interferometer. The main activity is the procurement and assembly of the optics and optomechanics required to set up an undergraduate experiment that can explore some of the aspects of LIGO's gravity wave experiments. By engaging with local vendors who manufacture optomechanics, we also aim to build local capability and reduce cost for production of multiple kits, thus supporting both WP5 and WP6.

Anil: The idea is to build a small interferometer with beam folding which would allow students to look at the different noise interactions. There are documents that have been put together different experiments (<https://dcc.ligo.org/DocDB/0153/P1800178/002/P1800178-v2.pdf>) . It's not a large interferometer but they use beam folding to extend the length. I've put in two different packages one is outreach and the other one is entrepreneurial as I am hoping to get some of the components bough here in India.

Giles: Can you remind me the costs? We have been building other interferometers here from Borja Sorazu, I was wondering how these link together? Have you spoken to him?

Anil: I think they might be similar, the optomechanics might be similar. My feeling at this point is the more the merrier but we are trying to find companies here that can make these components.

Giles: I think having things built in India is a good thing as we need to engage with Indian companies.

Somak: I think Anil's proposal doesn't require much money, so I think both fit into the budget you are talking about and can be spent by December.

Sukanta: Yes, I think these fit well with the expenses.

Ed: apologies for interrupting, as I am late to this meeting. Umakant and I have been spending time looking at the tables. Fast photo detectors and an Aluminum ref cavity. Let me put in a proposal, it wouldn't be immediately and I might split it into two as I might be able to get some of the items much faster.

Giles: Do put in the proposal, as looking at some of the proposals for example on Martin's side we have an estimate of 5k that would go in travel but this should probably come off the main Newton Bhabha fund.

Umakant: Giles was asking about a student coming to Sheffield, and I was telling them that until the cavity is ready then there's no point on having the student in the lab.

Ed: Yes, Apologies, I need to get in contact with Nick Savage and is just a matter of making a second one they've already made but hopefully it can be done and once the cavity is in the lab then I am all forward to your student coming once things are ready.

Umakant: Once we get the delivery times then we can have a student over.

Somak: I have a question re Martin's proposal, can it be done before December?

Giles: Requesting banners should be done fairly quickly I think and others can be done in the timescale, if it needs to be rebranded for LIGO India then we might need to find

out exact time scales. If in the end we have say 5k to be spend then I am sure we could purchase travel for this upcoming meeting and we can compensate for others that need to be spend with the normal grant. There was another proposal sent from Suresh this morning (UK). Suresh you want to say a few words on this?

Suresh: This is a proposal for the labs in IUCAA, we were wondering if fabrication and supply of these mirrors could be done as part of this grant .

Giles: when you talk about light suspension is this similar to what we have been building in Hannover? The other thing is the expensive part will be the mirrors which the newton Bhabha will not have funds for. What were you thinking re the metal suspensions? Seeing as we built up the procedure for pulling fibers in house here in Glasgow, I think we could probably host that, I think the expensive part will be procuring the mirrors so I am not sure we could cover that from the grant. In terms of your PSL, this looks similar to what Ed and Umakant are looking in terms of the set up in Sheffield.

Suresh: Is similar although I am not sure what they are building up but it is a different lab so we would need to duplicate.

Umakant: By no means it is similar

Somak: I think Suresh and Umakant need to speak to each other. We need to figure out what Umakant is building up as well as exactly what Suresh wants so I think we need to speak amongst ourselves and see if there are communalities that can be achieved by December.

Sukanta: I think this conversation needs to keep going and if the components can be bought for both set ups then that would be good.

Ed: The components can be scarily expensive so it needs to be looked into.

Suresh: Umakant and I have been speaking to each other so that there is no duplicate. I have also been speaking to Raja and we have some thoughts in how to make the references here in RRCAT.

Ed: You should ask if they have the reference that is meant to go in LIGO India and that would mean you don't have to buy it.

Anil: We do have a lot of expertise here with high power laser so if someone needs that kind of expertise you should contact e offline.

Giles: I agree with what's been said this is interesting but if probably longer than this institutional funds. But this is good stuff and need to have some more discussion. I think that about the end of the call, are there any calls questions?

Sukanta: Let me know in advance so we can work with the dates.

Giles: Excellent. Next call will be in about 3-4 weeks time. Thanks everyone.