

Journal - Around the World in 79 days - Spring 2013

Part 6: Around IUAC - the Inter University Accelerator Center 4-16 April

4 April, Thursday: The flight from Shanghai was much longer than expected, arriving here about 2 am Indian time this morning (but 2.5 hours later in Chinese time). Fortunately, Tapan Nandi and a student, Prashant Kumar, were there to pick me up and drive back to IUAC - the Inter University Accelerator Center - where i will be working about half of the next 33 days or so. I have separated the first of my stay into two parts - the first about activities in and around IUAC, the second, probably shorter, about visits to Delhi sites and sights on the second weekend.

Tapan leads an atomic physics group, and part of his research involves graduate students from several Indian universities, mostly close to Delhi, who have completed most of their coursework and stay in residence for 2-4 years completing an experimental thesis. There are some advanced courses given at IUAC, and while here I will be giving a set of atomic physics classes similar to those I gave at Fudan University, with a different emphasis given the difference in the level of understanding and interests of the Chinese and Indian students - more on those differences later...

Thursday-Friday was a 2-day conference in honor of the IUAC director Amit Roy who is



Just arrived - 3 am



Amit Roy and wife

retiring in June (65 years age limit in India): I met him long ago at Argonne around 1990, not long before he became director here. Mostly accelerator and nuclear physics talks (his subjects); but here are two slides that you might appreciate: the tale of Buddha and Son-Goku. The context here is that *Wideroe* was an early European accelerator scientist of the 1930s - US textbooks usually mention *Lawrence* (e.g. Lawrence Hall of Science) instead. The final afternoon was devoted to commemorative speeches - all very serious - the Indian way, I guess.

The conference meant that we had very few discussions about our own research before the weekend, and Tapan was quite surprised to learn that I considered the weekend as the time to explore the environs, etc. He is quite a slave driver, expecting his students to be working not only all 7 days a week, but also well into the evening, even though he may not be there himself. This is part of the IUAC mentality since everyone lives on-site: the professors' and their families

Tale of Buddha and Son-Goku

- One novel "Journey to the West" was written in China in 15 century. Here "West" means "India".
- In this novel, there is a story about Buddha and a super-monkey, Son-Goku. (This monkey is very much like Hanuman in Ramayana)
- Son-Goku challenged Buddha as stating that he could reach the end of the world. He flew and flew and finally found a mountain with five peaks. He thought that this was the end of the world.
- As a proof of arriving at the end of the world, he wrote one character at each peak and then returned back to Buddha. Buddha showed to Son-Goku his fingers with characters written by Son-Goku.
- Buddha thus showed to Son-Goku that he could only fly within a palm of Buddha.
- We, present accelerator physicists, are still on a palm of Wideroe. All high-energy accelerators are AC accelerators and the highest energy accelerators are colliders.



in apartment houses on one side, while most of the students and others live in residence halls next to the lab. It is like working in your home office - the temptations to work (play for a scientist) are very strong. I am living in one of the nicer residence halls at the top of a hill overlooking the lab and a construction site - in a fairly large suite. Here is a comment/piece of philosophy from me: the constant grinding away on a project does not give people time to think “*outside the box*”, and especially to make original contributions; in my experience, the mind has to be liberated often enough to make unexpected connections and to find original problem solutions. I don’t think I convinced Tapan of this, but the students at least were listening, and one or the other did join me on some of the “*out-of-jail*” of IUAC explorations.



Tapan hunting for graduate students (Red Fort museum)

Perhaps that is a little harsh on Tapan - I enjoy working with him, we both follow up on ideas from discussions, and he is hardworking himself: many people in India still work at least 6 days a week; despite the rise of democracy, this is still a fairly strong authoritarian society, with most people “knowing their place” in the social structure. He has made a clear delineation of his “own” research, as opposed to projects that the students are following for their doctoral degree. [After all he is not their “major professor” - just their research director: their degree comes from their own university]. Most of the discussions thus center around his own most recent work - unfortunately, his latest project depends on some of his previously published measurements - I can show that his interpretations are wrong on a couple of key points, and it is going to be difficult to convince him (diplomatically) - first shot did not get there, and it will take a few more explicit calculations to confirm/or not confirm.

On the other hand, our work from last summer has been accepted by one of the most important physics journals, and I am focusing with him on some follow-up experiments - that is a very positive development; also I am working with the students on a project, also continuing from last year, which is now coupled into a burgeoning collaboration with Roger and the group in Shanghai. The world of atomic spectroscopists seems to be a small one: Roger was the student in Lund, Sweden of a very good friend, Indrek Martinson; while Tapan just spent 6 months in Sophia University, Tokyo with Yoshiro Azuma, who worked with me for 5 years at Argonne, as postdoc and staff member, before moving back to Japan (you boys may remember him at some of our thanksgiving/christmas feasts). Although the four of us have diverged somewhat in our physics interests, it looks likely that we will all collaborate again during the next few years. It is also indicative that the far east is playing a much larger role in present day scientific research. This trend seems likely to continue given the state of European and USA economies.

Change of subject: a year ago, they had started digging a big hole in the hillside next to the accelerator lab, in preparation for a large auditorium center; this year it is a big construction site, with concrete walls and floors being made, and is a beehive of amazing activity - I have to describe some of it to you!

There is almost no mechanical equipment on site - just one large towering crane - apart from a small metal-cutting machine, and one cement mixer; everything is done by hand - and by whose hands? The families of manual labor workers live just outside the gate to IUAC in temporary corrugated iron shacks alongside the roadway. Each morning they come to work, whole families at a time - fathers, mothers and their children - I see them walking up the entrance



Going to work at 8 am

road just before 8 am. Typically both parents work at the site, while the children, of all ages, play in the shade of the trees and stone piles

on the site, or in the shade of the trees nearby. They set up little hammocks between the tree trunks for the babies to sleep in. Both parents have to work to earn enough for the family to survive, since each worker is paid only 200 rupees (\$4) per day. They do this 7 days a week 8 am till 6 pm. I was proud of the two students who agreed that this is really slave labor and they certainly saw the inequity of such employment, and understand that it has to be eliminated from India. But for miles all around the



Overview: construction site is between grassy knole and the residence hall.



Working in the construction site

lab, one finds very similar squalid “shack-villages” with no power, no running water or sewage facilities, and presumably many of the inhabitants out of work. I am sure every area of Delhi has similar encampments.

It is a huge social problem, and such people who see no way out of the squalor turn to violence, theft and rape, as we read about in the papers.



Family at work



Children's playground

At the site, the men are doing much of the hard labor - one example: they bend the reinforcing metal rods by passing them through two or more fixed pegs on top of a concrete pillar, and pulling the end as a long lever-arm, then cutting them to the right lengths.

The women mostly carry bowls full of sand, stones, cement, etc on their heads to the parts of the worksite as needed (on top of their heads sit rings of cloth to help balance the heavy bowls - see pics); and above it



The supervisors



Going home



Their homes - ATM and IUAC entrance on right

all, in the shade of a tin roof, sit one or two

supervisors: I asked them whether it was ok to take photos, and they happily agreed, even though in this country it is a bit frowned upon to take pictures of women, as it also is in China. One should also remember that the temperatures are about 100F, most days, and the construction site has no shade - just a few trees around it where the smaller children can play.

Besides the weekly two-hour classes I give on atomic physics - about 8 to 10 students and faculty attend - I have started daily evening sessions with Tapan's 3 graduate students to teach them about data analysis in atomic spectroscopy. The students are not as motivated or as advanced in their physics understanding as the Chinese students at Fudan, but of course I have seen only a small set of samples: unlike the Chinese who were able to tackle most problems (together) with little input from Roger, there needs to be a lot more hand-holding with the Indians. Things they have in common are respect and courtesy for their professors, and they get paid very little (but a lot more than 200 rupees per day)

One evening after the class, we agreed to go have pizza at the local little market - I had been there a couple of mornings to get breakfast necessities -



Crows waiting for breakfast

coffee, milk, even some granola-type stuff; the Indian breakfast at the canteen consists of a thin pancake with syrup, plus a little cup of tea or coffee, for which there always seems to be a 15 minute wait (oh to be back in Shanghai with the magnificent



Sunrise over IUAC

buffet every morning). The little market is really little - 2 little grocery stores, 2 little restaurants, and 3 or 4 other stores, including a liquor store.

When we went there for our pizza supper, I was amazed to see a huge traffic jam, cars parked every which way on both sides of the road: explanation? LIQUOR! One of the few places for miles around and it gets swamped every evening - the line ran all the way down to the pizza parlor - which was essentially empty; and perhaps you thought that Indians don't drink! Many of them were just sitting in the cars or on the sidewalk drinking bottles of beer or something stronger. The pizza was ok - each meal of a small pizza, a drink, plus a side cost 99 rupees (about \$1.80); and that was too much to eat for one of the students - we will try somewhere else next since it turned out to be a Pizza Hut chain - PHD=Pizza Hut Delivery.



Lab workers checking the pressure tanks

Another day, the two students, Basu and Gaurav agreed to take me to a real shopping center - to get there we had to take a bus ride to the metro, and traveling about 5 stops to an outer suburb and then an auto-rickshaw ride to the shopping center - true enough, there was a three story American style center with food and other shops, but all at American prices - no one buying except ice-creams, or going to the



Gaurav and Basu at the mall

movie theatre - the students considered all prices outrageous - there was even a Manchester United shop of soccer gear - we gave them a hard time for not stocking shirts of any other clubs - eg Huddersfield or even Manchester City or Arsenal. So we took the rickshaw and train and got things to eat at the little stalls at the metro stop - at about one tenth

the price - so no need to go that mall again.