Conference Summary

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We heard many interesting talks in the past week both from the foreign visitors and from the Chinese participants. The topics dealt with radio spectroscopy, radio continuum (polarization), pulsars, VLBI and instrumentation. I am sure that if we met in Xian only ten years ago we would have had predominantly talks on solar research and the age of the participants would be some twenty years older. I believe we met here the future of Chinese radio astronomy.

The talks on instrumentation were very interesting, giving an overview about the present telescopes and about the plans for the future. This is where indeed a great effort is necessary: to give the vital astronomical community in China world-class instruments. The telescope in Urumqi stands out as an instrument that has great capabilities at high radio frequencies due to the good site. A continuous effort of surface adjustment could make this instrument competitive on the world scale for years to come. The radio telescope in Shanghai is under threat from the city encroachment. The Shanghai telescope is an important element in the VLBI Network. The plan for a 50-m Miyun telescope for lower radio frequencies is a good project, if this instrument is constructed as quickly as it is planned. I suspect however that the dramatic development of the city of Beijing will continue and lead to high interference levels at Miyun in the future. In Effelsberg we have acceptable interference levels because of the deep valley in which the telescope is placed. The project FAST is aimed to develop a world-class instrument. At present a lot of work is being put into a design capable of high-frequency observations. I wonder if the site in Guizhou province will allow much high-frequency work. Would a return to the original specification of a telescope for wavelength of 21 cm and longer result in a construction in the nearer future? This would be great! I was somewhat surprised by the 115 GHz absorption measurements at the high elevation Delingha site of the Purple Mountain Observatory. It seems that the radome is partly responsible for the high absorption values. Could a better radome be purchased to make this telescope a world-class facility? There are active international co-operations in the mm/sub-mm wavelengths range with partners outside China. However, somewhere in China a good site for this last open window of the universe must surely exist. One further area of endeavor that needs great support is the buildup of electronic laboratories in the astronomical institutes. Only the best detectors placed in good telescopes give best results. The industry does not supply the few receivers that radio astronomers need. We must build our own receivers.

The radio spectroscopy talks showed that Chinese astronomers have good contact to the international community in this area of research. We had talks based on observations with the SMA in Hawaii and the HHT on Mt. Graham. Talks on massive star formation and megamasers were world class. The German counterparts gave us an interesting overview on what is possible with the 100-m telescope in Effelsberg with the IRAM telescopes, the HHT and the VLA. I believe in this area of research the careful choice of the right instrument for a specific project gives best results. This will need great flexibility, also on behalf of the administrators. I can imagine that it is hard to understand why a student must fly to Hawaii, then to Chile and back to Tucson to complete a project.

Radio continuum polarization mapping allows the study of magnetic fields. The diffuse radio emission from galaxies is due to relativistic electrons being braked in magnetic fields. We had several talks from the German delegates on this topic. Surveys of the Milky Way made in Effelsberg were described. At present a medium latitude survey of the Milky Way at 21 cm (in polarization) has been completed. I hope that in the near future matched observations will be possible at 6 cm wavelength with the Urumqi telescope. Again new equipment is needed, a polarimeter system, to give new insight of the magnetic fields of the Milky Way. Additional methods of study of Galactic magnetic fields, such as the use of Rotation Measure of pulsars and extragalactic sources were also discussed since close links exist in this research between NAO (Beijing), ATNF (Sydney) and the MPIfR (Bonn). Studies of supernova remnants and external galaxies rounded off this part of the conference.

Pulsars are a topic of common research between Australia and China. The description of pulsar work at Parkes by R. Manchester showed the great opportunities in this research area. Several interesting talks were given showing great enthusiasm of the Urumqi pulsar group. Details of pulsar beams, pulsar moding and the occurrence of glitches were discussed. A new cooled 18 cm receiver has been installed in the Urumqi telescope that will allow observations with higher sensitivity. However pulsar projects have to be carefully chosen because the data from large telescopes (Arecibo, Effelsberg, Parkes, GBT) have obvious advantages for studies of weak pulsars, especially for millisecond pulsars. Talks dealing with scintillation of pulsars were given by both sides. The various pulsar data bases offer many opportunities that were shown to be used in a clever manner by the young astronomers. However, as a user of a data base one is not able to steer the direction of research. For this access to a telescope is essential. Pulsar research will benefit from the new Miyun telescope and would be ideally supported by FAST.

The VLBI community is international and two Chinese telescopes participate in the European Network as well as other ad-hoc experiments. Obviously great progress has been made under the limiting circumstances of small telescopes. In Europe two large telescopes are under construction for VLBI: 40-m in Spain and a 64-m telescope in Sardinia. The strong VLBI group in Shanghai needs a high performance instrument (50–64 m diameter radio telescope) for higher frequencies at a better site urgently. The development of a correlator in Shanghai is a very important step to be “one’s own master” able to correlate special experiments at home, without shipping the tapes to the joint correlators like JIVE or NRAO. Also in being skilled in correlations makes it easier to initiate new experiments. I was sorry that no-one from MPIfR’s strong VLBI group could come. There was a JIVE symposium in Bonn a short time ago and people were still recovering from this.

The theoretical community is as always very international with many contacts. I enjoyed the interesting talks that are so important for the observers to clearly define their projects. Here a great strength are the colleagues with joint appointments in China and the USA. The formation of jets and circumnuclear starburst rings were discussed. Talks dealing with the disk–halo connection as well as the dynamo theory were presented. In a way there is a lot of progress but also still a gap between observations and theory. I welcome the nice mix of theory and observations that was achieved at this conference.

Finally I would like to comment that the computing skills demonstrated by our hosts were amazing. I was impressed by the fact that Madame Ye Shushua gave a power-point presentation while I used overhead transparencies. We must learn from our Chinese friends and hope to meet your standard soon.

I wish to thank the organizers for this excellent conference. In the first place our thanks go to Han Jin-Lin but also to the local astronomers from Xian and the student helpers. You made this event most memorable. Thank you!