Prof. Govind Swarup
Founding Director, National Centre for Radio Astrophysics (NCRA), Tata Institute of Fundamental Research (TIFR)

Most important awards, prizes and academies

Membership of Professional Societies: Royal Society, London; Indian National Science Academy; Indian Academy of Sciences; National Academy of Sciences, Allahabad, India; Third World Academy of Sciences; Indian Geophysical Union; Maharashtra Academy of Sciences; International Academy of Astronautics; Pontifical Academy of Sciences; Royal Astronomical Society, London; Astronomical Society of India (President 1975-77); International Astronomical Union (IAU) (President, Commission 40 on Radio Astronomy, 1979-82); Executive Committee, Inter Union Commission for Frequency Allocation (IUCAF till 1995); IAU Working Group for Future Large Scale Facilities (1994-2000); Chairman, Indian National Committee for International Union of Radio Science (URSI) (1986-88 & 1995-97); Editorial Board, Indian Journal of Radio & Space Physics; Editorial Board (1990-2000), National Academy of Sciences, India (1997-2000); Indian Physics Association; Indian Physical Society; Institution of Electronics & Telecommunication Engineers; Post-detection Sub-Committee of SETI of International Astronautical Federation (Chairman, 1994-98); Chairman, URSI Committee for Developing Countries (1996-2002); URSI Standing Committee for Future General Assemblies (1999-2002). Awards: 1973 Padma Shri; 1972 S.S. Bhatnagar Award, Council of Scientific & Industrial Research, India; 1974 Jawaharlal Nehru

Fellowship for 2 years; 1984 P.C. Mahalanobis Medal, Indian National Science Academy; 1986 Biren Roy Trust Medal, Indian Physical Society, Calcutta; 1987 Dr. Vainu Bappu Memorial Award, Indian National Science Academy; 1987 Tskolovosky Medal, Federation of Cosmonautics, USSR; 1987 Meghnad Saha Medal, National Academy of Sciences, India; 1988 The Third World Academy of Sciences Award in Physics; 1990 John Howard Delinger Gold Medal, International Union of Radio Sciences; 1990 R.D. Birla Award in Physics, Indian Physics Association; 1991 FIE Foundation Award for Eminence in Science & Technology, Ichhalkaranji, India; 1993 Gujar Mal Modi Science Award, Modi Foundation, India; 1993 The C.V. Raman Medal, Indian National Science Academy; 1994 Sir Devaprasad Sarbadhikari Medal, Calcutta University; 1995 M.P. Birla Award, Birla Institute of Astronomy and Planetarium Sciences, Calcutta; 1999 12th Khwarizmi International Award, Iran; 2001 H.K. Firodia Award; 2006 Herschel Medal of the Royal Astronomical Society; 2007 Grote Reber Medal.

Summary of scientific research

During 1953-65 Prof. Swarup made the discovery of 'Type U' solar radio bursts; developed a gyro-radiation model for explaining the microwave solar emission and made studies of the radio emission from the Quiet Sun. In 1959 he developed a round trip transmission technique for phase measurements, which has been used in almost all the radio interferometers in the world. In 1962 he found the first example of a steep spectrum 'bridge' of radio emission between the two radio lobes of the powerful radio galaxy, Cyg-A, using the Stanford Compound Interferometer; such bridges allow estimates of the age of a radio galaxy. During 1963-70, he constructed a 530 m long and 30 m wide parabolic-cylindrical radio telescope of a unique and innovative design at Ooty in South India, which was placed on a suitably inclined hill so as to make its long axis of rotation parallel to that of the earth, enabling it to track celestial radio sources in hour angle for 9.5 hrs. Using the method of lunar occultation, it provided for the first time high-resolution angular data (1 to 10 arc sec) for more than 1,000 weak radio sources, which provided an independent evidence for the Big Bang model. Ooty Occultation observations of the galactic centre source, Sgr-A, yielded the first 2-dimensional separation of its thermal and non-thermal emission. During the 1980s, Swarup studied characteristics of jets, cores and hot spots of quasars based on polarization observations. During 1984-96, he conceived and directed the design and construction of the Giant Metrewave Radio Telescope (GMRT), consisting of 30 fully steerable parabolic dishes of 45m diameter that are located in a Y-shape array of about 25 km in extent in Western India. A novel concept developed by him made it possible to construct such large antennas very economically. GMRT is a highly versatile instrument. It is the world's largest radio telescope operating in the frequency range of about 130-1430 MHz. At present he is making observations with the GMRT of the emission and absorption of atomic hydrogen from objects in the early Universe. Recently, along with S.K. Sirothia, he has investigated deficiency of radio sources at 327 MHz towards the prominent cold spot of the cosmic microwave background radiation. To summarize, during the last 40 years he has made important contributions in areas such as solar radio emission, interplanetary scintillations, pulsars, radio galaxies, quasars and cosmology.

Main publications

Books: *Quasars*, IAU Symposium 119, G. Swarup and V.K. Kapahi (eds), Reidel Publications, Dordrecht, July 1986; *History of Oriental Astronomy*, IAU Colloquium 91, G. Swarup, A.K. Bag and K.S. Shukla (eds), Cambridge University Press (1987); *Asia-Pacific Astronomy*, 6th Asian-Pacific Regional Meeting on Astronomy of IAU, V.K. Kapahi, N.K. Dadhich, G. Swarup and J.V. Narlikar (eds), Indian Academy of Sciences, Bangalore, 1995; *The Universe at Low Radio Frequencies*, IAU Symposium No. 199, A.P. Rao, G. Swarup & Gopal Krishna (eds), Astronomical Society of the Pacific, 2003. *Articles*: Swarup, G. and Parthasarthy, R., Solar brightness distribution at a wavelength of 60 cm - Part-I: The quiet Sun, *Austr. J. Phys.*, 1955, 8, 487-97; Swarup, G. and Parthasarathy, R., Solar brightness distribution at a wavelength of 60 cm - Part-II: Localised radio bright regions, *Austr. J. Phys.*, 1958, 11, 338-49; Maxwell, A. and Swarup, G., A new spectral characteristic in solar radio emission, *Nature*, 1958, 181, 36-8; Bracewell, R.N., Swarup, G., and Seeger, C.L., Future large radio telescope, *Nature*, 1962, 193, 412-6; Swarup, G., *et al.*, The structure of Cygnus A, *Astrophys. J.*, 1963, 138, 305-9; Swarup, G., *et al.*, Radio observations of the quiet Sun at 49 cm, *Nature*, 1966, 212, 910-1; Swarup, G., A large cylindrical telescope at Ootacamund for radio astronomy observations, *Proc. Symp. on Antenna, Radio & Telecom. Res.*, CSIR, New Delhi, 1968 (Supplement 1, pp. 1-4); Swarup, G. and Kapahi, V.K., A simple image forming technique suitable for multifrequency observations of solar radio bursts, *Solar Physics*, 1970, 14, 404-13; Swarup, G., *et al.*, Large Steerable Radio Telescope at Ootacamund, India, *Nature Physical Science*, 1971, 230, 185-8; Swarup, G., *et al.*, Lunar occultation observations of 25 radio sources made with the Ooty Radio Telescope: List 1, *Astrophysical Letters*, 1971, 9, 53-9; Gopal-Krishna, Swarup, G., *et al.*, Occultation of Sgr A, *Nature*, 1972, 239, 91-3; Joshi, M.N., Kapahi, V.K., Gopal-Krishna, Sarma, N.V.G., and Swarup, G., Occultation of 50 radio sources at 327 MHz, *Astronomical Journal*, 1973, 78, 1023-9; Kapahi, V.G., Damle, S.H., Balasubramanian, V. and Swarup, G., An electrically steerable array of 968 Dipoles for the Ooty Radio Telescope, J*ournal of the Inst. Electron. and Telecom. Engrs.*, 1975, 21, 117-22; Gopal-Krishna and Swarup, G., The radio source Sagittarius A, *Astrophysical Letters*, 1976, 17, 45-7; Swarup, G., Theory and application of interplanetary scintillations, *J. Scient. Ind. Res.*, 1977, 36, 569-79; Swarup, G., Proposal for an International Institute for Space Sciences and Electronics and for a Giant Equatorial Radio Telescope as a collaborative efforts of the developing countries, *Bull. Astron. Soc. India*, 1981, 9, 269-77; Swarup, G., *et al.*, Optical identification-flux density relationship for radio galaxies, *Astron. Astrophys.* 1982, 107, 190-6; Swarup, G., *et al.*, On evolutionary models of radio sources, *Proc. of the Vatican Study Week on Cosmology and Fundamental Physics*, Ed. H.A. Bruck, G.V. Coyne and M.S. Longair, Specola Vaticana, 1982, 383-90; Swarup, G., Sinha R.P. and Hilldrup, J., Hot spots and radio lobes of quasars, *Mon. Not. R. Astr. Soc.*, 1984, 208, 813-43; Swarup, G., The Ooty Synthesis Radio Telescope: first results, *J. Astr. Astrophys.*, 1984, 5, 139-48; Swarup, G., *et al.*, Giant Equatorial Radio Telescope, *Astrophys. and Space Science*, 1984, 99, 403-7; Saikia, D.J., Swarup, G. and Kodali, P.D., Polarization properties of steep-spectrum radio cores, *Mon. Not. R. Astr. Soc.*, 1985, 216, 385-94; Swarup, G., *et al.*, Absorption lines and the radio structure of quasars, *Mon. Not. R. Astr.*

Soc., 1986, 220,1-18; Swarup, G. and Subrahmanyan, R., Search for proto-clusters at metrewavelengths, *Observational Cosmology*, ed. A. Hewitt, *et al.*, Reidel Publications, Dordrecht, 1987, 441-4; Joshi, M.N., Swarup, G., *et al.*, A new electronically steerable 1056 dipole array at 327 MHz for the Ooty Radio Telescope, *Bull. Astron. Soc. India*, 1988, 16, 111-21; Sukumar, S., Velusamy, T., Rao, A.P., Swarup, G., *et al.*, Ooty Synthesis Telescope: design and performance, *Bull. Astron. Soc. India*, 1988, 16, 93-110; Swarup, G., Evolution of radio galaxies & quasars in Essays on Particles and Fields (Eds. B.V. Sreekantan & R.R. Daniel), *Festchrift Volume on Prof. M.G.K. Menon*, Indian Academy of Sciences, Bangalore, 1989, 149-66; Subrahmanian, K. and Swarup, G., The gaseous halos of evolving galaxies: a probe using the linear sizes of radio sources, *Mon. Not. R. Astr. Soc.*, 1990, 247, 956-62; Djorgovski, S., Meylan, G., Klemola, A., Thompson, D.J., Weir, W.N., Swarup, G., *et al.*, A Search for the optical/IR counterpart of the probable Einstein ring source 1830-211, *Mon. Not. R. Astr. Soc*. 1992, 257, 240-4; Subramanian, K. and Swarup, G., A cluster of protogalaxies at redshift 3.4, *Nature*, 1992, 359, 512-4; Swarup, G., Giant Metrewave Radio Telescope - Its possible use for SETI, *Acta Astronautica*, 1992, 26, 239-42; Swarup, G., Radio Astronomy and the Developing Countries. *In the Vanishing universe, Proc. IAU/ICSU/UNESCO Meeting Adverse Environmental Impacts on Astronomy* (ed. D. McNally), Cambridge University Press, 1993, 109-13; Swarup, G., Experimental astronomy in India, *Proc. IUCAA Dedication Seminar*, 29-30 Dec. 1992, IUCAA (1997), New International Publication, 1997, 163-73; Sawant, H.S., Ludke, E., Subramanian, K.R., Fernandes, F.C.R., Cecatto, J.R., Rosa, R.R., Sobral, J.H.A., Swarup, G., *et al.*, High resolution decimetric solar radioheliograph, *NASA Workshop*, ASP Conference Series, 2000, 206, 347-50; Swarup G., Sarkar, A., Observations of Associated HI Absorption in Radio Galaxies and Quasars using GMRT, *Bull. Astr. Soc. India*, 2002, 30, 743-6; Swarup G., Search for HI Reionization Epoch in the Early Universe, *Bull. Astr. Soc. India*, 2003, 31, 451-2; Poonam Chandra, Swarup, G., Kulkarni, V.K., Kantharia, N.K., Associated HI observations in the Z=3.4 radio galaxy B2 0902+343 observed with the GMRT, *J. Astrophys. Astr.*, 25, 57-65, 2004; Swarup, G., From Potts Hill (Australia) to Pune (India): The journey of a radio astronomer, *J. Astronomical History and Heritage*, 9(1), 21-33, 2006; Swarup, G., The Puzzles of the universe and the giant metrewave radio telescope, *The Republic of Science Golden Jubilee Vignettes*, ed. Ranjit Nair, published by Scientia, an Imprint of the Centre for Philosophy and Foundations of Science, 36 Panchshila Park, New Delhi, 110017, 1-13, 2007; Swarup, G., Wind drag factors for low solidity wire-meshes for parabolic dish antennas, *Proc. Fourth National Conference on WIND Engineering*, NCWE-2007, held at Structural Engineering Research Centre, Chennai, 30 Oct. - 1 Nov. 2007, eds N. Lakshmanan, Arunachalam, S., Gomathinayagam, Allied Publishers, New Delhi, 129-36, 2007; Swarup, G., Reminiscences Regarding Professor W.N. Christiansen, *Journal of Astronomical History and Heritage*, 11(3), 194-202, 2008; Sirothia, S.K., Swarup, G., Shukla, H., Observations at 325 MHz of the WMAP cold spot, *The Low-Frequency Radio Universe*, eds D.J. Saikia, Dave Green, Y. Gupta and Tiziana Venturi ASP Conference Series, vol. LFRU, 51-4, 2009; Swarup, G., Scientific Quest into the Evolution of Life in the Universe, *Scientific Insights into the Evolution of the Universe and of Life*, Oct. 31-Nov. 5, 2008, eds W. Arber, N. Cabibbo and M. Sanchez Sorondo, Pontifical Academy of Sciences, Vatican City, 45-56, 2009; Swarup, G., Growth and

Development of Radio Astronomy in India, *Astronomy in India: a Historical Perspective*, ed. T. Padmanabhan, Springer Pub., New York, 129-78, 2010.

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