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VENTSPILS AUGSTSKOLA

ASTRON



Project „Building on Advanced Lofar Technology for Innovation, Collaboration, and Sustainability” (BALTICS)

Training Week „Radio Astronomy and Radio Interferometry”

April 18 - 22, 2016

Ventspils University College

Day	Time	Topic	Location
Radio Astronomy (Prof. P.N. Wilkinson)			
Monday April 18	10:30	Morning coffee	C400
	11:00	(Lecture 1) Phenomenology of radio sources. Pulsars, radio stars, radio galaxies and quasars. A new light on the familiar: e.g. HII regions, supernova remnants, spiral galaxies.	C406
	12:00	(Interactive session I) Phenomenology	C406
	13:00	Lunch	D103
	14:00	(Lecture 2) Brightness, flux density and brightness temperature, emission mechanisms, thermal and synchrotron continuum radiation, spectral lines, simple radiative transfer, antenna characteristics.	C406
	16:00	(Interactive session II) Physics of radio astronomy	C406
Tuesday April 19	8:30	Morning coffee	C400
	9:00	(Lecture 3) The antenna as an aperture; Rayleigh distance; far-field Fourier transform relations and differences for the near field; effective area, aperture efficiency; beam solid angles and antenna gain; antenna temperature; Ruze formula; Wiener-Kinchine theorem, convolution and antenna smoothing; parabolic antennas and basics of quasi-optics.	C406
	11:00	(Interactive session III) Antennas	C406
	12:00	Lunch	D103
	14:00	(Lecture 4) Johnson noise; Nyquist theorem and noise temperature, band-limited noise, minimum detectable signal, noise accounting in receivers; heterodyne systems and sidebands; polarization sensitive receivers; gain instabilities; Dicke-switched and correlation receivers.	C406
	16:00	(Interactive session IV) Signals and systems	C406
Wednesday April 20	18:00	Common dinner	
	8:30	Morning coffee	C400
	9:00	(Lecture 5) Spectral line receiver concept: detectability of spectral lines, filter bank, autocorrelation and Fourier transform receiver principles.	C406
	10:00	(Lecture 6) Interferometric receiver concepts; spatial and temporal coherence; adding, phase switching and multiplying types.	C406
	11:00	(Interactive session V) Spectral lines/interferometry	C406
	13:00	Lunch	D103



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Day	Time	Topic	Location
Radio interferometry (Dr. N. Jackson)			
Wednesday April 20	14:00	(Lecture 1) Revision of basic interferometry: visibilities and the interferometer phase equation.	C406
	15:00	(Interactive session VI) Introduction to AIPS/CASA and loading data	C406
Thursday April 21	8:30	Morning coffee	C400
	9:00	(Lecture 2) The u-v plane, aperture synthesis, visibility measurement.	C406
	10:00	(Interactive session VII) Data inspection and editing	C406
	12:00	Lunch	D104
	13:00	(Lecture 3) Field of view limitations: bandwidth and integration time smearing, w-term. Signal-to-noise.	C406
	14:00	(Interactive session VIII) Calibration	C406
Friday April 22	8:30	Morning coffee	C400
	9:00	(Lecture 4): Deconvolution and the CLEAN algorithm.	C406
	10:00	(Interactive session IX) Imaging	C406
	12:00	Lunch	D104
	13:00	(Lecture 5) Correction of telescope-based gains: closure quantities, self-calibration. Practical map-making with simple VLA data; Clark algorithm, hybrid mapping.	C406
	14:00	(Interactive session X) Self-calibration. Introduction to Difmap.	C406
		(Interactive session) Introduction to scripting in AIPS and Casa	C406

Short Curriculum Vitae

P.N. Wilkinson is a professor of Radio Astronomy in the University of Manchester since 1999. He has been involved with the Jodrell Bank Observatory for over 40 years. Much of his research work has involved radio interferometry at high angular resolution including the UK MERLIN and the international Very Long Baseline Interferometry (VLBI) arrays. In 1990 he wrote the first published paper describing the scientific rationale and structure of a radio interferometer array with a collecting area of one square kilometre. This has since developed into the international Square Kilometre Array (SKA) project and he was involved in leadership roles with SKA planning and R&D within national and international forums until 2010. He has developed (with aid of graduate students) a small low-cost radio phased interferometer array „MUST” (Manchester University Student telescope).

N. Jackson is a reader in the Jodrell Bank Centre for Astrophysics, School of Physics and Astronomy. He obtained a BA in Natural Sciences (Physics) from Cambridge University in 1986, and a PhD in astronomy from the University of Manchester in 1989. He spent nearly two years as a postdoctoral researcher in Manchester, followed by a three-year PDRA position at Leiden Observatory, Netherlands. He returned to Manchester as a temporary lecturer in 1994, obtaining a lectureship in 1998. His main fields of interest in research are in extragalactic astronomy, in particular, gravitational lensing, a phenomenon in which light from background galaxies or quasars is deflected by galaxies lying along the line of sight. He was involved in the CLASS gravitational lens search, led from Manchester, which discovered 22 lenses of the ~100 now known. In the future he is interested in developing methods for lens discovery to obtain a much larger sample. He is also interested in the phenomenology of active galaxies, including population studies and the physics of nuclear regions of active galactic nuclei.