

On behalf of the APEX-SZ collaboration:



Max-Planck-Institut für Radioastronomie



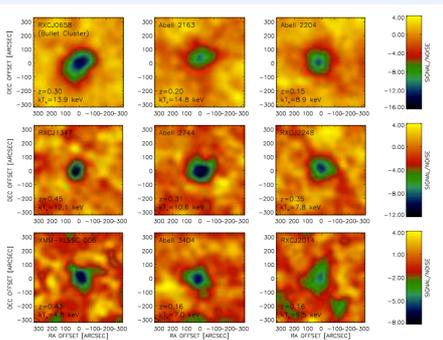
THE UNIVERSITY OF CHICAGO



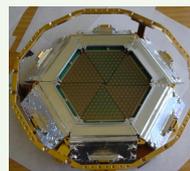
Abstract: The APEX-SZ experiment is a collaboration between Berkeley, University of Bonn, MPIfR, University of Chicago, Onsala, Cardiff, MPE and ESO operating a 280 element bolometer camera at the APEX telescope in Chile at an altitude of 5100 meters during 2007-2010. Targeted observations of over 40 X-ray selected galaxy clusters were made. The APEX-SZ group in Bonn has focused its research on non-parametric cluster modeling with APEX-SZ data and its combination with X-ray and weak-lensing results. A joint SZ/X-ray analysis has already been made for individual clusters and a combined analysis with the full APEX-SZ sample is currently under way. We aim to develop and optimize techniques for combining high resolution interferometric measurements with APEX-SZ data to extract information on the thermodynamic state of the intra-cluster gas at a wide range of spatial scales.

The APEX-SZ cluster sample

Targeted observation of **over 40 X-ray selected clusters with APEX-SZ until the end of 2010, a selection of which is shown in the figure below.**



Telescope and Instrument

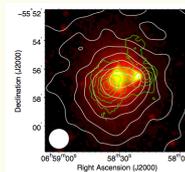


The 12 m APEX telescope (left) located at 5107m altitude on the Llano de Chajnantor plateau and the APEX-SZ TES bolometer array consisting of 330 bolometers (right). (Schwan et al. 2010)

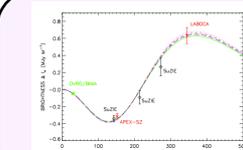
Characteristics:

primary mirror	12 m
band center	151 GHz
field of view	22'
beam FWHM	58"
bandwidth	24.5 GHz
surface accuracy	17-18 μm
NET _{CMB}	860 μK_{CMB} $\sqrt{\text{s}}$
efficiency	0.31
bolometers	280

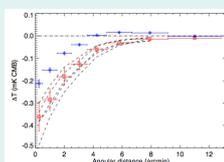
Published galaxy cluster science results and ongoing research



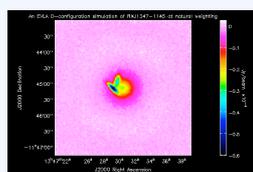
APEX-SZ observation of the Bullet cluster (white contours) overlaid on an *XMM-Newton* map and green weak lensing contours (Clowe et al.(2006)), the SZE interval being 100 μK_{CMB} . (Halverson et al. 2009)



SZE spectrum of the galaxy cluster Abell 2163 using observations from APEX-SZ (150GHz) and LABOCA (345GHz). The lines show the best-fit models using different temperature priors. (Nord et al. 2009)



Radial profile of the SZE temperature decrement of Abell 2204 at 150 GHz. The raw reduction is shown in blue and the mean deconvolved profile in red. (K. Basu et al. 2010)



Simulation of RXC J1347-1145 using the cluster shock model from Mason et.al. (2010) for the EVLA D - configuration. This is an ongoing PhD project aiming to combine interferometric and bolometric SZ data to gain insight into the physical state of the intra-cluster gas over a wide range of spatial scales. (S. Burkutean et al. 2011 in preparation)

Science goals of the collaboration

- Obtain a deeper understanding of cluster physics through the combination with X-rays
- Calibrate SZ vs mass scaling relations using X-ray and lensing results
- Make cosmological predictions