MILLIMETER-WAVE CONTINUUM OBSERVATION OF GALAXIES

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1. Millimeter-Wave Emission from Galaxies

Continuum observation of galaxies in millimeter-wave gives informations on dust emission from molecular clouds, free-free emission from HII region and synchrotron emission from SNR and diffuse component. The free-free emission can be observed only at millimeter-wave freqnencies and their emission is optically thin, it can be a good indicator of their star-formation activities.

Millimeter-wave continuum observation of galaxies have been performed with the 45 m telescope with 7-element bolometer array (NOBA) at 150 GHz and SIS receivers at 100 and 43 GHz. Mapping observations of M82, NGC1068, IC342, M87 have been performed, which gave the first single dish images at either of the observing frequencies, and we got accurate total power spectrum of galaxies and their distributions.

2. The Starbust Galaxy M82

The starburst galaxy, M82, shows extended structure at 150 GHz and 100 GHz, which are shown in figure 1. Both the central compact component and diffuse component above the galactic plane is observed. Their total power spectrum is derived by integrating over the mapping region, as shown in figure 2(*left*). Our observation in millimeter-wave shows larger fluxes than ever reported. This deviation comes from the diffuse component, which have not been observed previously. The continuum spectrum can be interpreted as combination of interstellar dust, synchrotron and free-free emissions. In figure 2(*right*), fluxes integrated over single dish images and lower frequency VLA observations are plotted and fitted by three component model. Synchrotron loss at higher frequency is taken into account for

Y. Sofue (ed.), The Central Regions of the Galaxy and Galaxies, 143-144.

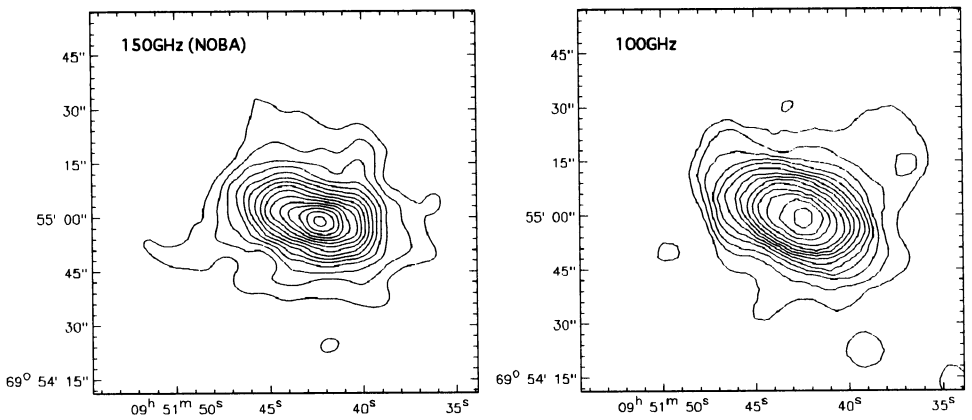

Figure 1. *Left*: The 150GHz image of M82. Beam size is 12″ (FWHM). Contour interval is 25mJy. *Right*: The 100GHz image of M82. Beam size is 16″ (FWHM). Contour interval is 20mJy.

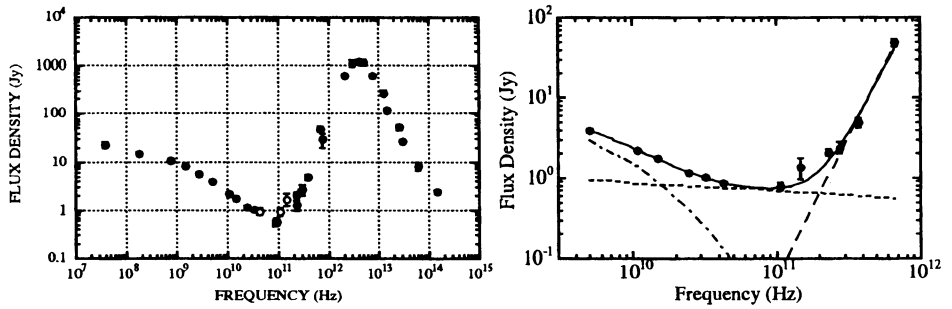

Figure 2. *Left*: Integrated spectral energy distribution of M82. Our data is shown by open circle. *Right*: Spectral fit with dust (*dashed line*), free-free (*dotted line*) and synchrotron (*dot-dashed line*) emissions. Synchrotron emission is modeled by second order polinomial on logarithmic plot to incorporate with the synchrotron loss. Plotted data are only from single dish mapping observations and low frequency VLA observations.

the fit. In millimeter-wave, their emission is dominated by free-free emission, which indicates that star formation activity of the galaxy is higher than ever estimated.

References

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https://doi.org/10.1017/S0074180900084400 Published online by Cambridge University Press