

## The Nuclear Starburst in NGC 4945

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**Abstract.** NGC 4945 is with  $D \sim 3\text{--}4$  Mpc one of the nearest starburst galaxies known and a goldmine for molecular cloud research. A multi-line mm-wave study has been carried out towards its nuclear region with the Swedish-ESO Submillimetre Telescope (SEST). The study covers the frequency range from 82 GHz to 354 GHz and includes 80 transitions of 19 molecules, including rare isotope-bearing species. Applying a Large Velocity Gradient (LVG) code to the data,  $\text{H}_2$  densities and column densities of 22 molecular species are calculated. Many of these species indicate the presence of a prominent high density interstellar gas component characterized by  $n_{\text{H}_2} \sim 10^5 \text{ cm}^{-3}$ . Abundances of molecular species are calculated and compared with abundances observed toward the starburst galaxies NGC 253 and M 82 and galactic sources. Apparent is an ‘overabundance’ of HNC and CN in the nuclear environment of NGC 4945. NGC 4945 is the second known starburst galaxy with an HNC/HCN abundance ratio  $\geq 1$ . Carbon, nitrogen, oxygen and sulfur isotope ratios are also determined. The data indicate that high  $^{18}\text{O}/^{17}\text{O}$ , low  $^{16}\text{O}/^{18}\text{O}$  and  $^{14}\text{N}/^{15}\text{N}$  and perhaps also low  $^{32}\text{S}/^{34}\text{S}$  ratios ( $6.4 \pm 0.3$ ,  $195 \pm 45$ ,  $105 \pm 25$  and  $13.5 \pm 2.5$ , respectively) are characteristic properties of a starburst environment in an advanced evolutionary stage.