

SMILES プロジェクトからの教訓と SMILES-2 へ向けて Lessons learned from SMILES project, and possible SMILES-2

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Superconducting Submillimeter-Wave Limb-emission Sounder (SMILES) was the first instrument to use 4K cooled SIS (Superconductor-Insulator-Superconductor) detection system for the observation of the atmosphere in the frequency regions 625 GHz (Bands A and B) and 650 GHz (Band C) [1]. It has demonstrated its high sensitivity (System Temperature, $T_{\text{sys}} \sim 250\text{K}$) for measuring stratospheric and mesospheric species, O₃, HCl, ClO, HO₂, HOCl, BrO, and O₃ isotopes from Oct. 12, 2009 to Apr. 21, 2010 [2-5]. So it was very successful scientific program, even though it have been conducted as an engineering demonstration program.

Since SMILES operation has terminated after only 6 months operation due to failure of sub-mm local oscillator (and later 4K cooler system), there exist strong scientific demand to develop successor of SMILES, the SMILES-2, which has optimized and enhanced frequency coverage to observe: (a) BrO and HOCl without interferences of stronger emission lines, (b) N₂O, H₂O, NO₂, and CH₃Cl not covered by the SMILES frequency regions, and (c) O₂ line to measure temperature.

This paper will describes (a) list of SMILES publications on timeline, (b) lessons learned from SMILES project, and (c) possible SMILES-2 observations based upon those SMILES lessons.