



Measurements of Mars and Saturn for the above chart were done in fall 2007-spring 2008. The beam efficiency is consistent across the 1 mm band. A slight difference exists between  $h_{\text{pol}}$  and  $v_{\text{pol}}$  values due to optics-related beam squint.

$$\begin{aligned} \text{average } n_b &= 0.74 \pm 0.02 \\ \text{average } h_{\text{pol}} n_b &= 0.68 \pm 0.03 \\ \text{average } v_{\text{pol}} n_b &= 0.79 \pm 0.02 \end{aligned}$$

The error values above are 95% confidence intervals. Efficiencies were calculated using the technique described in Magnum (1993)<sup>1</sup>. In our calculations, the factor of  $\frac{1}{2}$  was omitted from equation 1 of Magnum (1993)<sup>1</sup>, because the SMT 1mm receiver is a single-sideband instrument. For  $T_{\text{saturn}}$  we used values plotted in Figure 4 of Weisstein & Serabyn (1994)<sup>2</sup>. The measured  $n_b$  values agree with the displayed Ruze formula:

$$\eta_b = \frac{1.2 * \varepsilon}{e^{-\left[\frac{4\pi(\sigma)}{\lambda}\right]^2}},$$

where  $\sigma$  is the surface rms of the SMT (15 micron),  $\varepsilon$  is the aperture efficiency (0.64), and  $\lambda$  is the observing wavelength.

<sup>1</sup> Magnum, J.G. *PASP*, 1993, 105, p 117-122

<sup>2</sup> Weisstein, E.W. & Serabyn, E. *Icarus*, 1994, 109, p 367-381