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**SXDF-UDS-CANDELS-ALMA 1.5 arcmin<sup>2</sup> deep survey: I. The survey description and source catalogue**

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We have conducted ALMA 1.1 mm high-resolution ( $\sim 0''.5$ ) observations of a contiguous  $105'' \times 50''$  or 1.5 arcmin<sup>2</sup> window (achieved by 19 point mosaic) in the SXDF-UDS-CANDELS. We achieved a  $5\sigma$  sensitivity of 0.28 mJy, giving a flat census of dusty star-forming galaxies with  $L_{\text{IR}} \sim 6 \times 10^{11} L_{\odot}$  (if  $T_{\text{dust}} = 40$  K) or  $\text{SFR} \sim 100 M_{\odot} \text{ yr}^{-1}$  up to  $z \sim 10$  thanks to the negative K-correction at this wavelength. We detect 5 bright sources ( $\text{S/N} > 5$ ) and 18 low-significant sources ( $5 > \text{S/N} > 4$ ; they will contain spurious detections, though) in the field. We find that these discrete sources are responsible for a faint filamentary emission seen in low-resolution ( $\sim 30''$ ), confusion-limited AzTEC 1.1 mm and SPIRE 0.5mm images. One of the 5 brightest ALMA sources is very dark in deep WFC3 and HAWK-I NIR images as well as VLA 1.4 GHz and 6 GHz images, demonstrating that deep ALMA imaging can unveil new obscured star-forming galaxy population.