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**C-axis persistent current and Cooper-pair tunnelling through intrinsic Josephson junctions in a ring-shaped  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  film** AHMAD MANSOUR, MOHAMED SABER, KIM CHOW, JAN JUNG, University of Alberta — We present the direct experimental observation of the temperature dependence of the persistent current  $I_{cj}$  due to tunneling Cooper pairs along the c-axis intrinsic Josephson junctions integrated into  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  ring-shaped thin films. The measured  $I_{cj}$  exhibits a linear temperature dependence over a wide range of temperatures well below  $T_c$ . Similar behavior was observed in different samples, confirming the reproducibility of the fabrication technique and the reliability of the results. Our fabrication and measurement techniques which allowed us to observe “pure” Cooper pair tunneling persistent current are superior to other techniques that are unable to separate Cooper pair from quasi-particles tunneling currents.

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