Cavity cooling of $^{88}\text{Sr}^+$ DAVID LEIBRANDT, YAT SHAN AU, ISAAC CHUANG, MIT — Cavity cooling is a method of laser cooling which uses coherent scattering to cool atoms [V. Vuletić and S. Chu, PRL 84, 3787 (2000)]. The closed atomic transition used in Doppler cooling is replaced by a cavity resonance, so cavity cooling can be used to cool to sub-Doppler temperatures and is in principle applicable to complicated atoms or molecules without closed transitions. We describe an experiment to study three-dimensional cavity cooling of a single $^{88}\text{Sr}^+$ ion confined in a linear RF Paul trap. Large cooling rates can be attained by operating near the 422 nm $S_{1/2} \leftrightarrow P_{1/2}$ optical dipole transition and using a 5 cm long near-confocal Fabry-Pérot cavity with commercially available mirrors of finesse $10^4$. Given a cavity alignment error $\leq 10 \mu\text{m}$ and a trap frequency of 1 MHz, the resolved sideband cavity cooling limit is $\leq 5$ motional quanta. We present details of the experimental proposal and its implementation.