

TES microcalorimeters for PTOLEMY

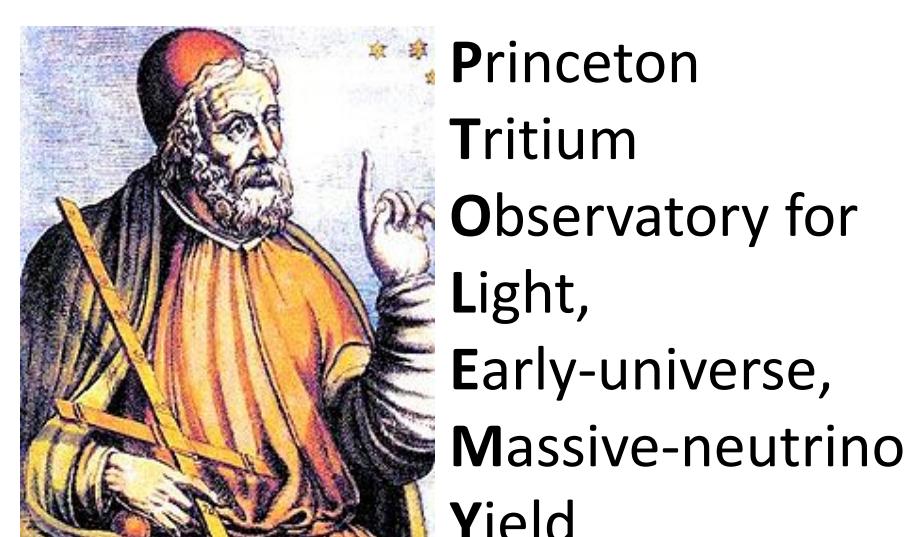
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Introduction

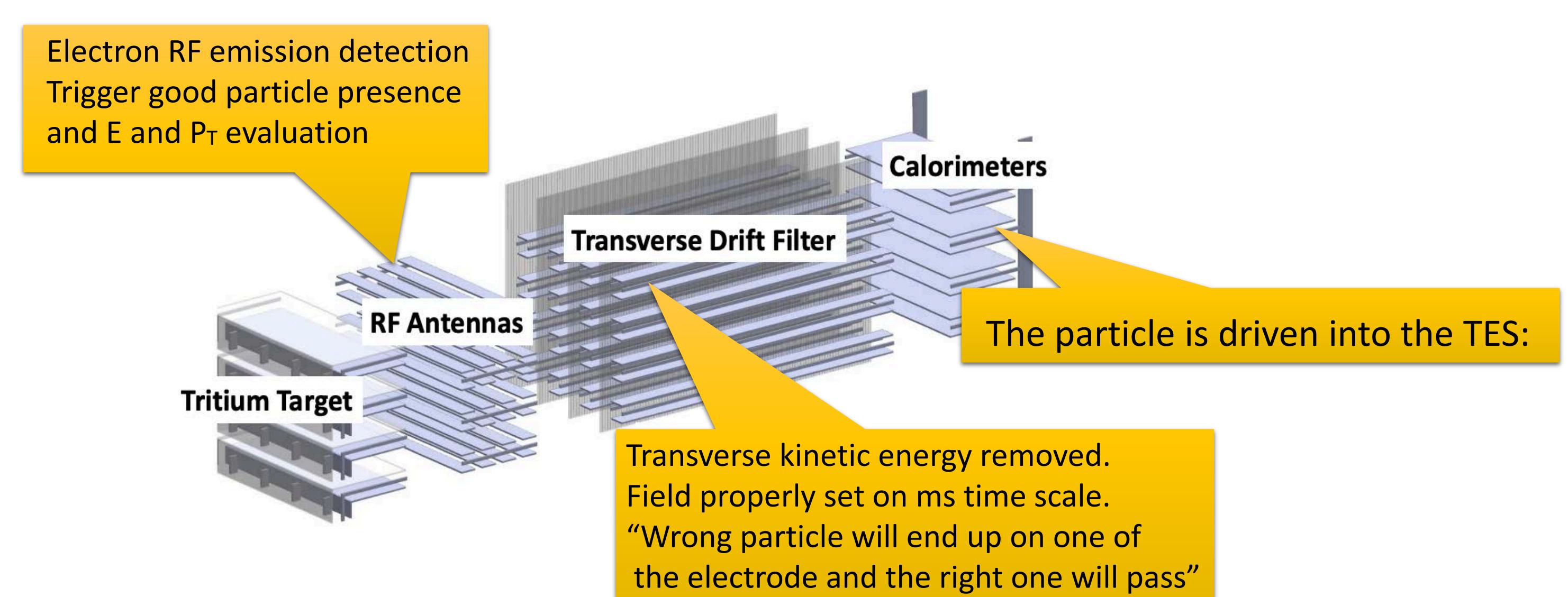
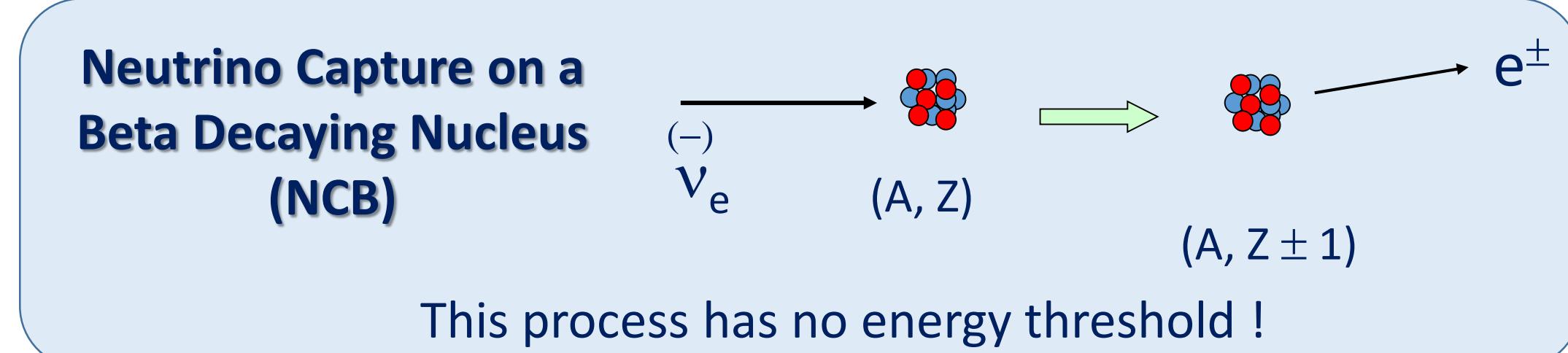


- The PTOLEMY project aims at detecting the Cosmological Relic Neutrinos.
- The detection of Relic Neutrinos would provide a unique experimental constraint on the Cosmological Standard Model.
- Any disagreement of the measurement from the prediction of the Cosmological Standard Model will generate extremely relevant consequences in cosmology.



Detection idea

Massive neutrinos and neutrino capture on beta decaying nuclei
A.G.Cocco, G.Mangano and M.Messina JCAP 06(2007) 015



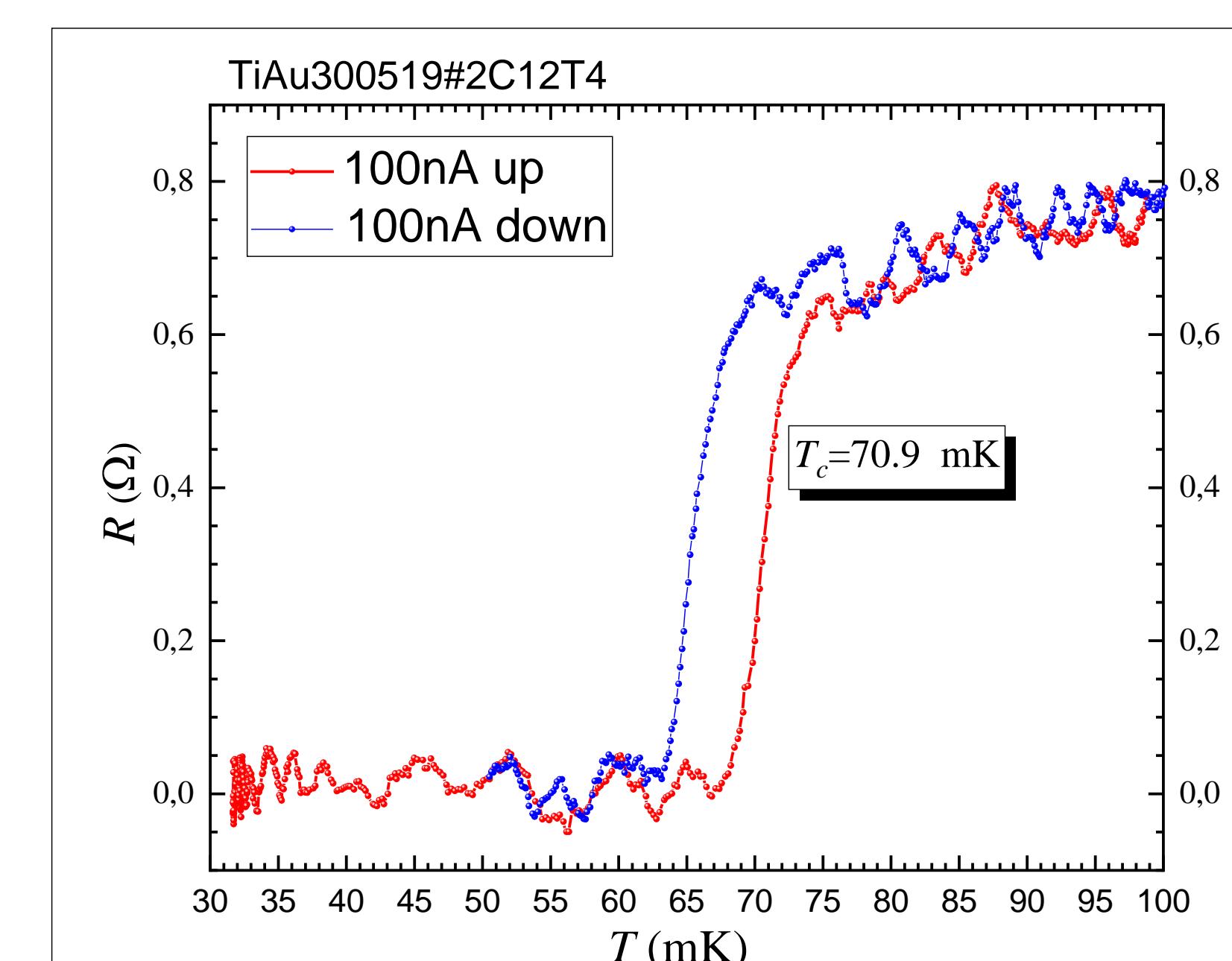
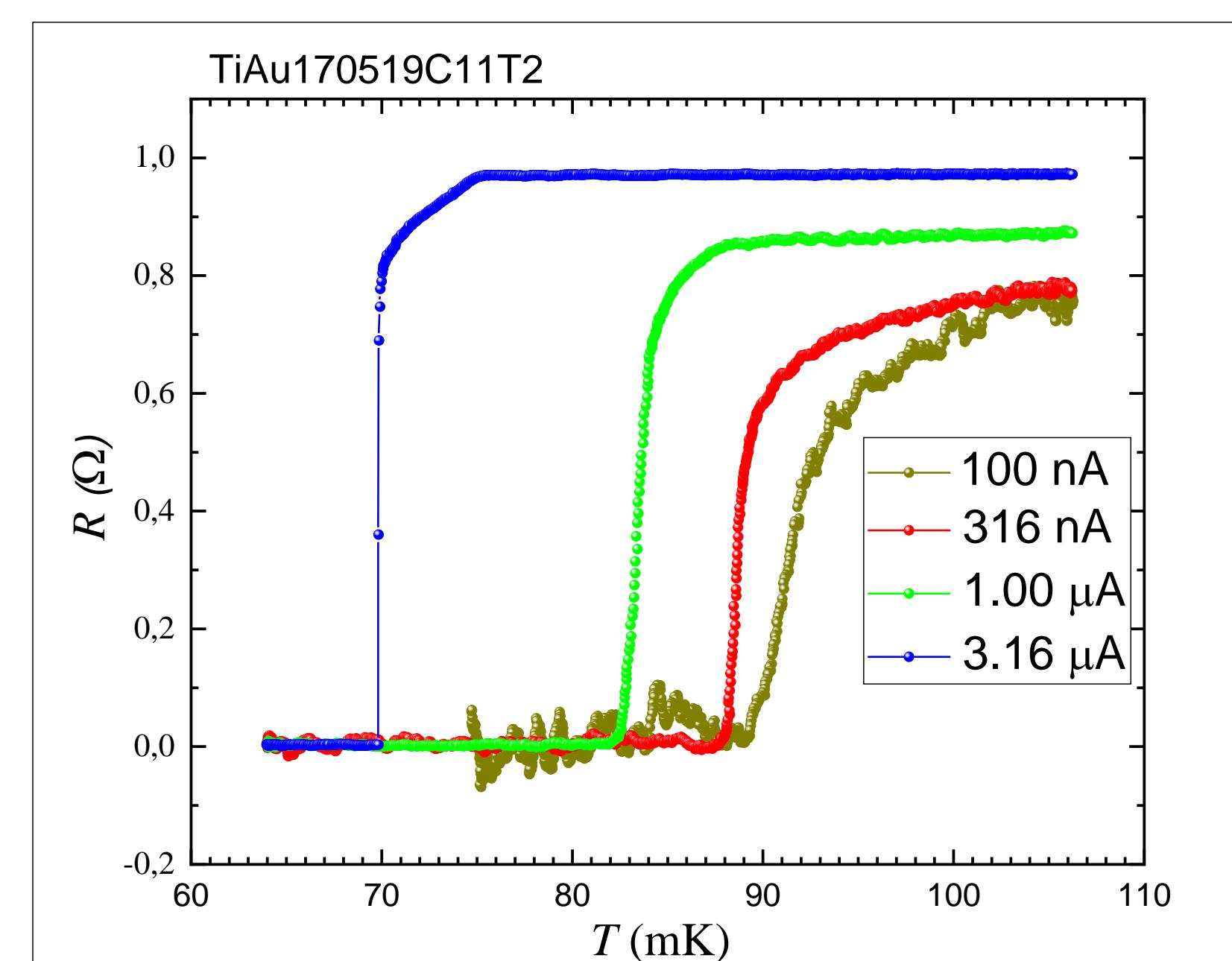
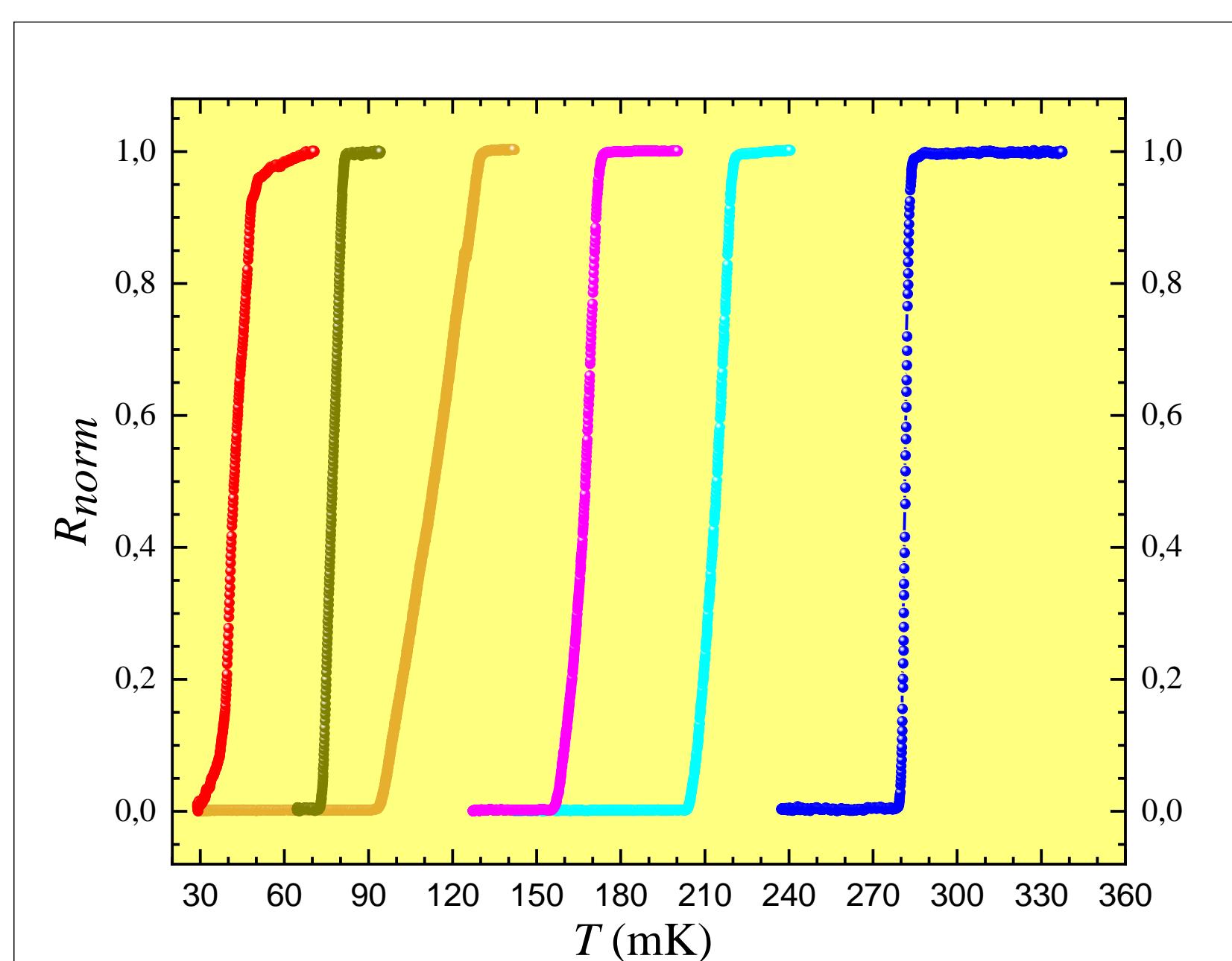
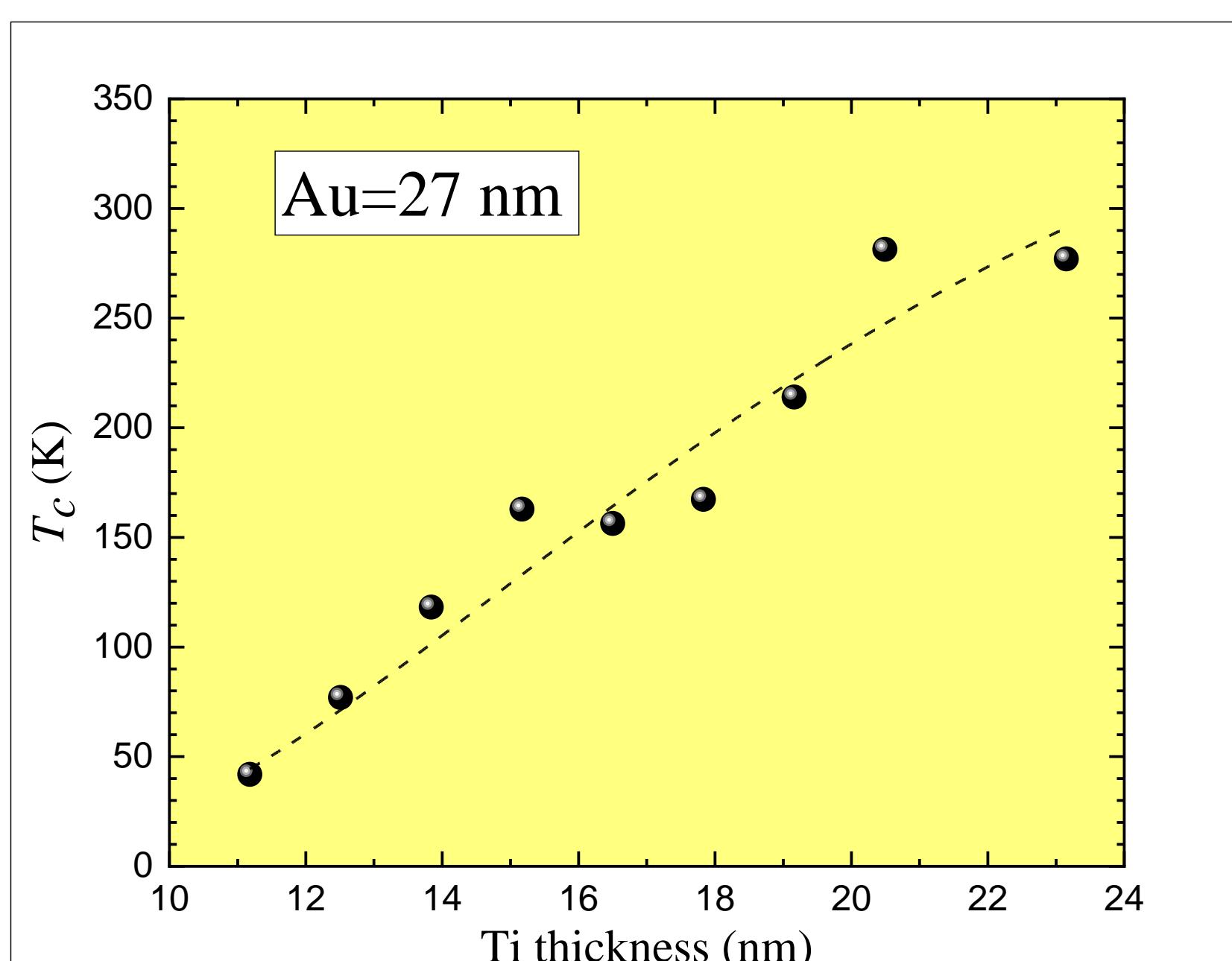
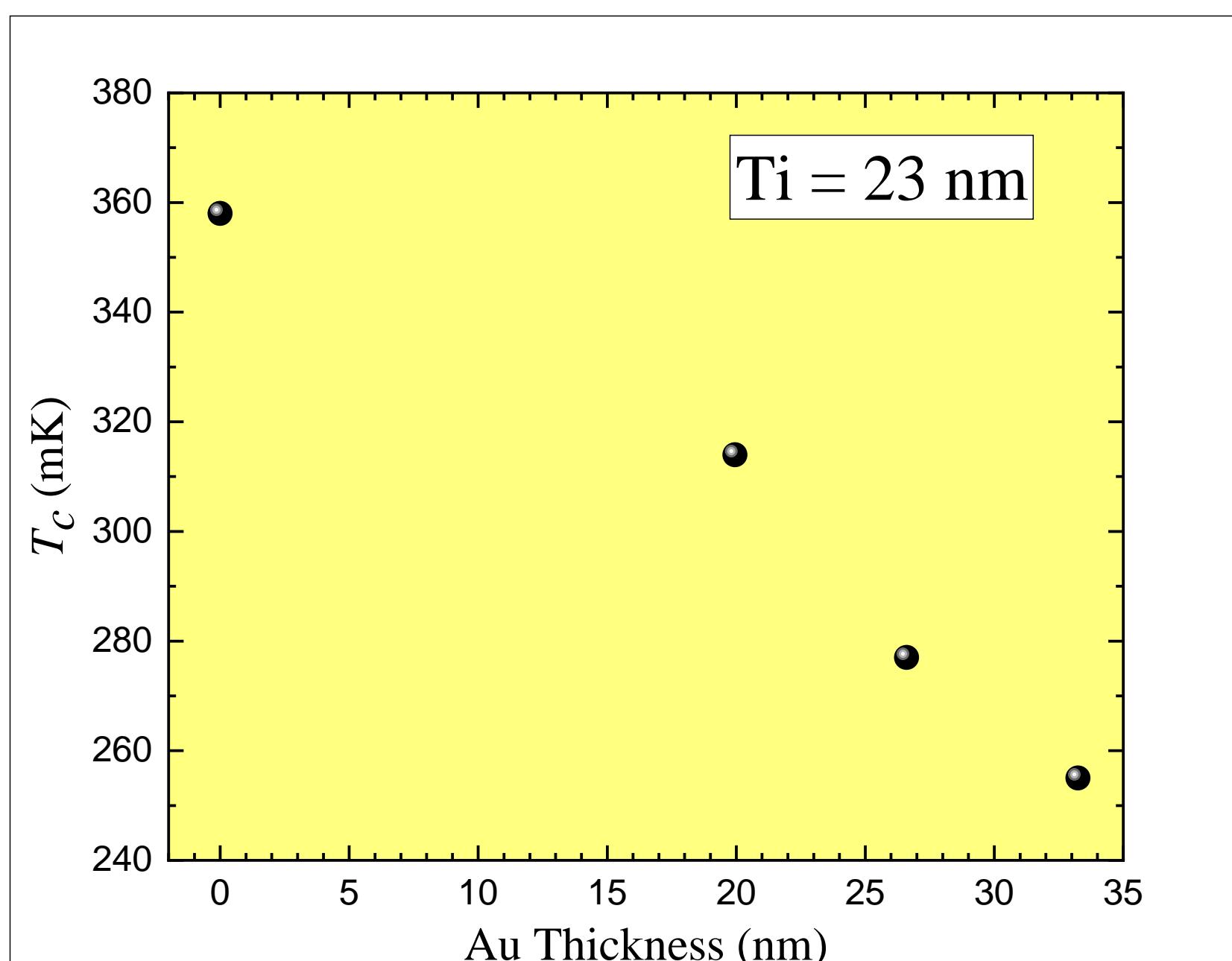
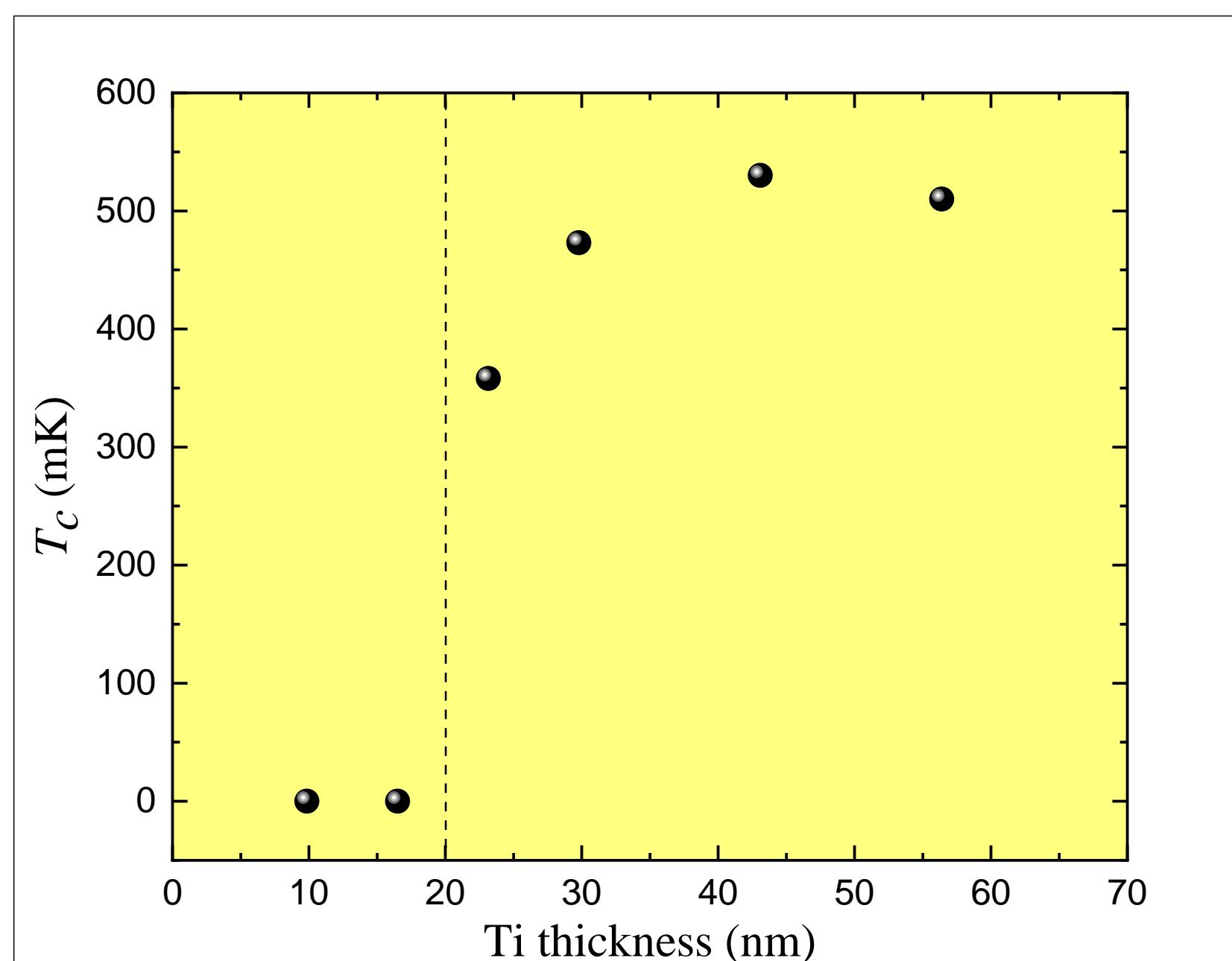
Detector constrains

- TESs for UV/NIR good candidate to detect also electrons
- Goal for electron resolution $\Delta E_e = 0.05 \text{ eV} @ 10 \text{ eV}$
- First characterization will be done at 1550 nm (10 eV ~ 13 photons)
- From [1]: $\Delta E = 0.11 \text{ eV} @ 0.8 \text{ eV}$, $T_c=106 \text{ mK}$, TiAu thickness 90 nm
- for TESs: $\Delta E \propto E^{1/3} T_c^{3/2} t^{1/2}$ where t is the film thickness
- Scaling results from [1] with $t=38 \text{ nm}$, $T_c=50 \text{ mK} \Rightarrow \Delta E_e = 0.05 \text{ eV} @ 10 \text{ eV}$

[1] L. Lolli, E. Taralli, C. Portesi, E. Monticone, M. Rajteri, Appl. Phys. Lett. **103**, 041107 (2013)

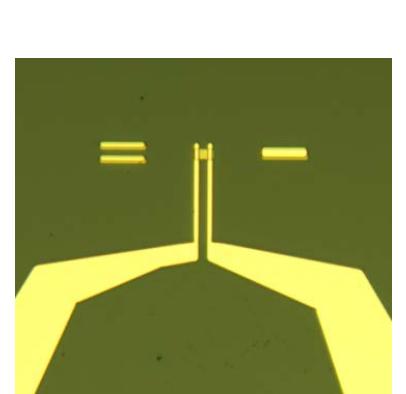
Experimental

Films



TESs

100 μm^2



400 μm^2

