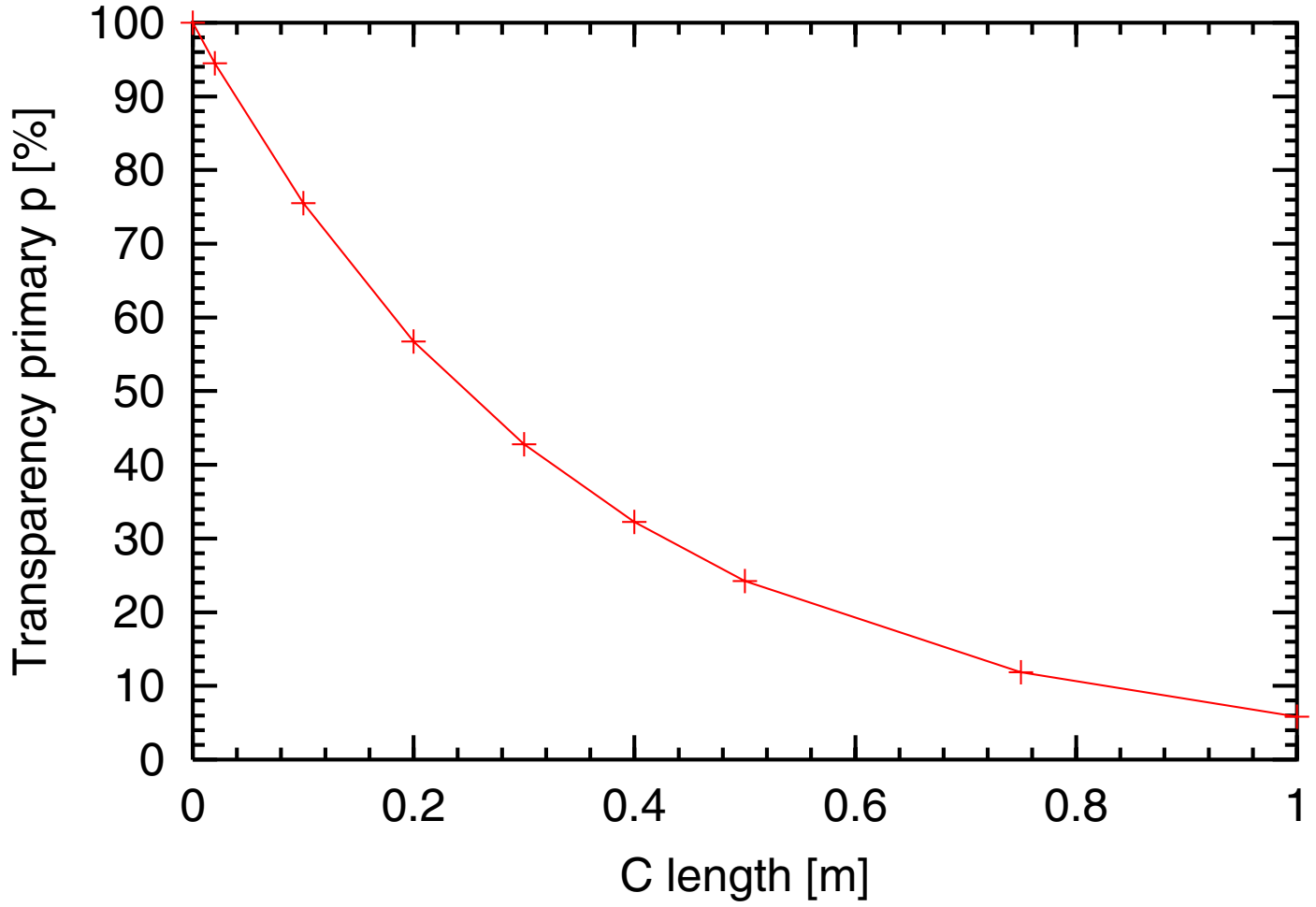
Shadow study
+
Loss rate specification per collimator

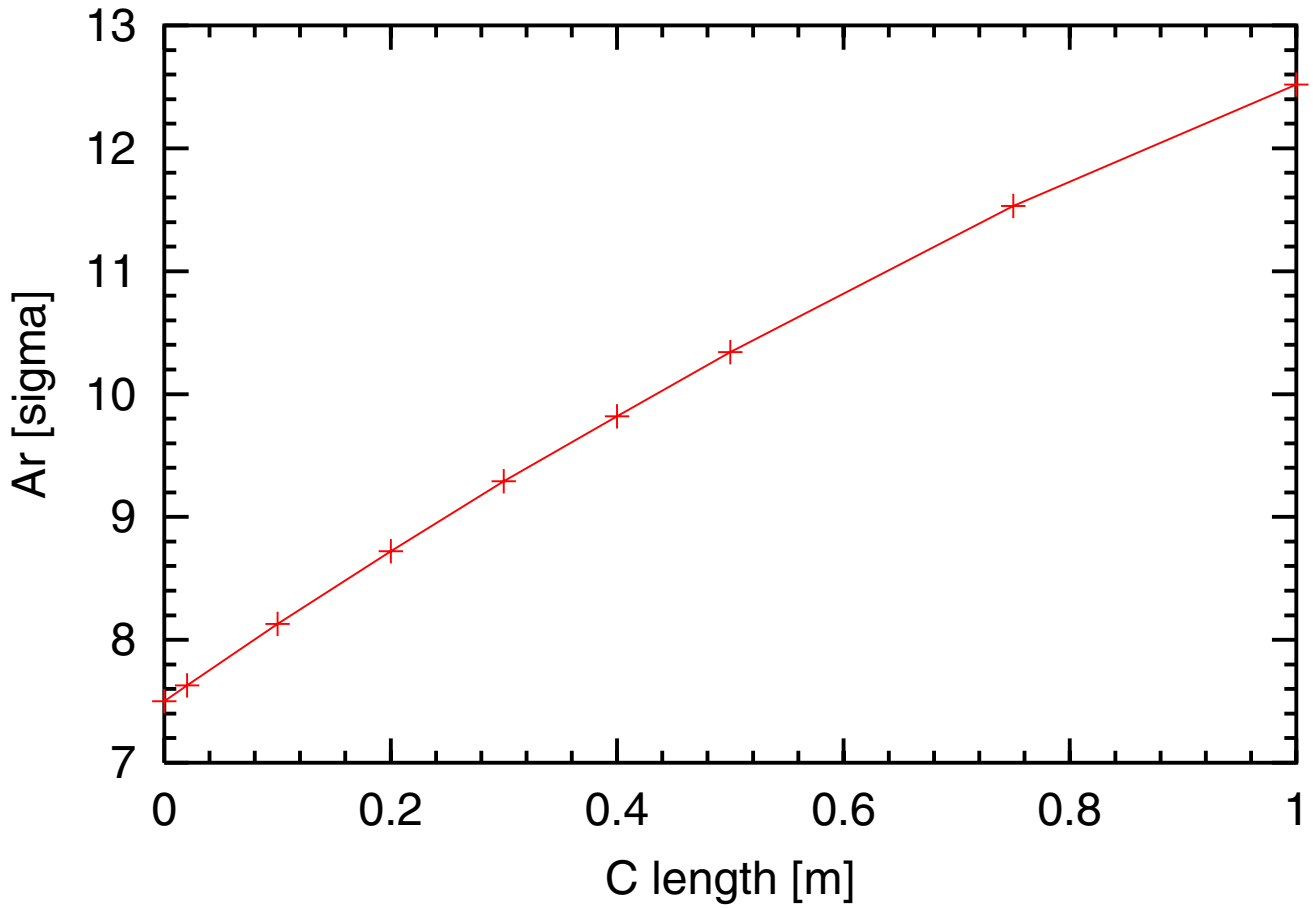
RWA 28/05/2003

1) Shadow study

Transparency for a pencil beam impacting at 7 sigma:

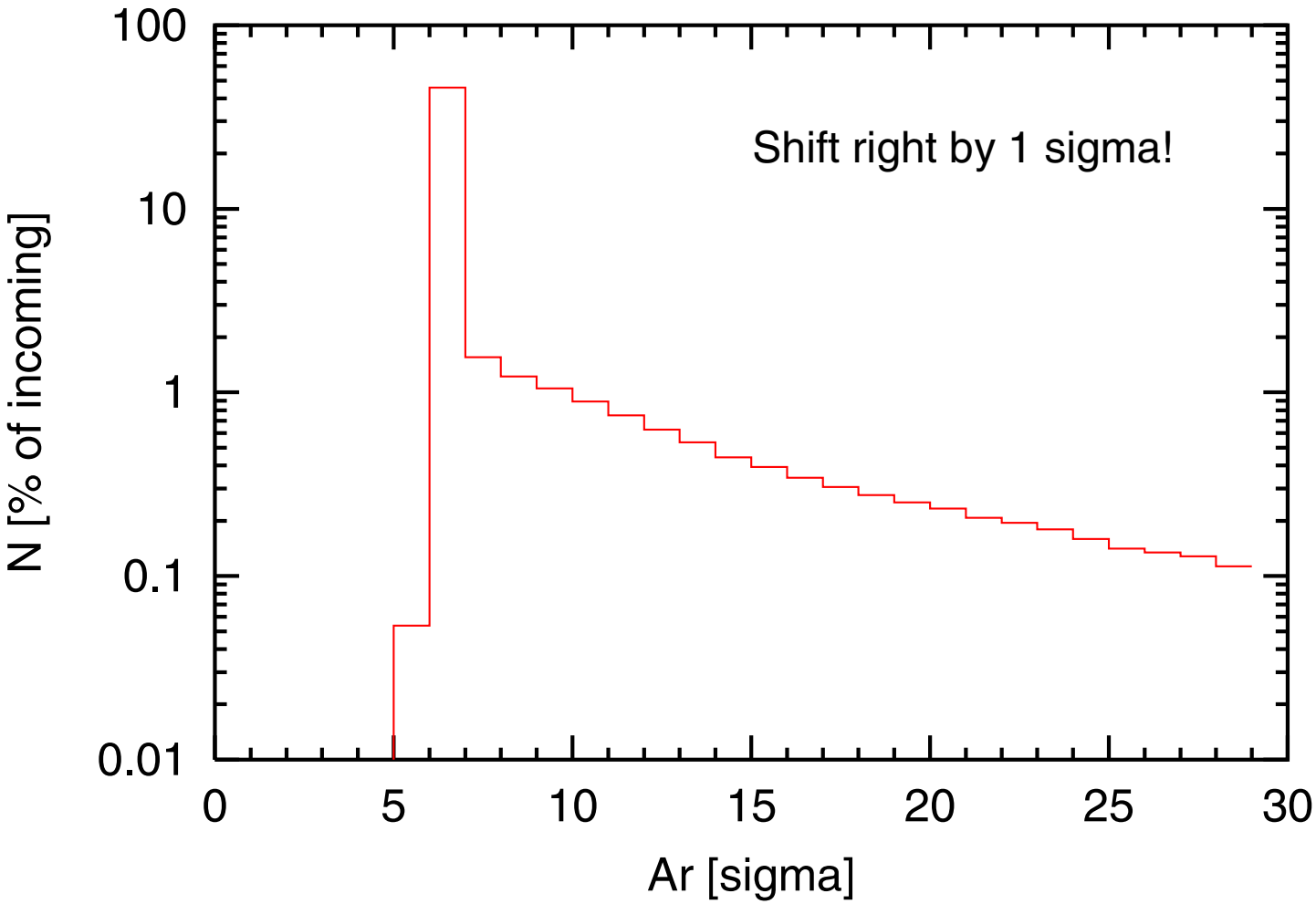


Primary 20 cm C collimators leak 60% of primary beam…



Scattered protons remain quite well focused…

Distribution for 20cm C:



Not much shadow! Downstream collimators will be hit by ~50% of perturbed beam!

Conclusion from “shadow study”:

We cannot rely on shadow from the primary C collimators.

Secondary collimators can be hit more severely!

Our assumption that secondaries can be hit is reasonable (unfortunately).

The secondary collimators provide good shadow (sufficient for Cu?).

Some of the later secondary collimators can profit (get only 10-30% of perturbed beam from dump or 1-2 sigmas out of the 5 sigmas).

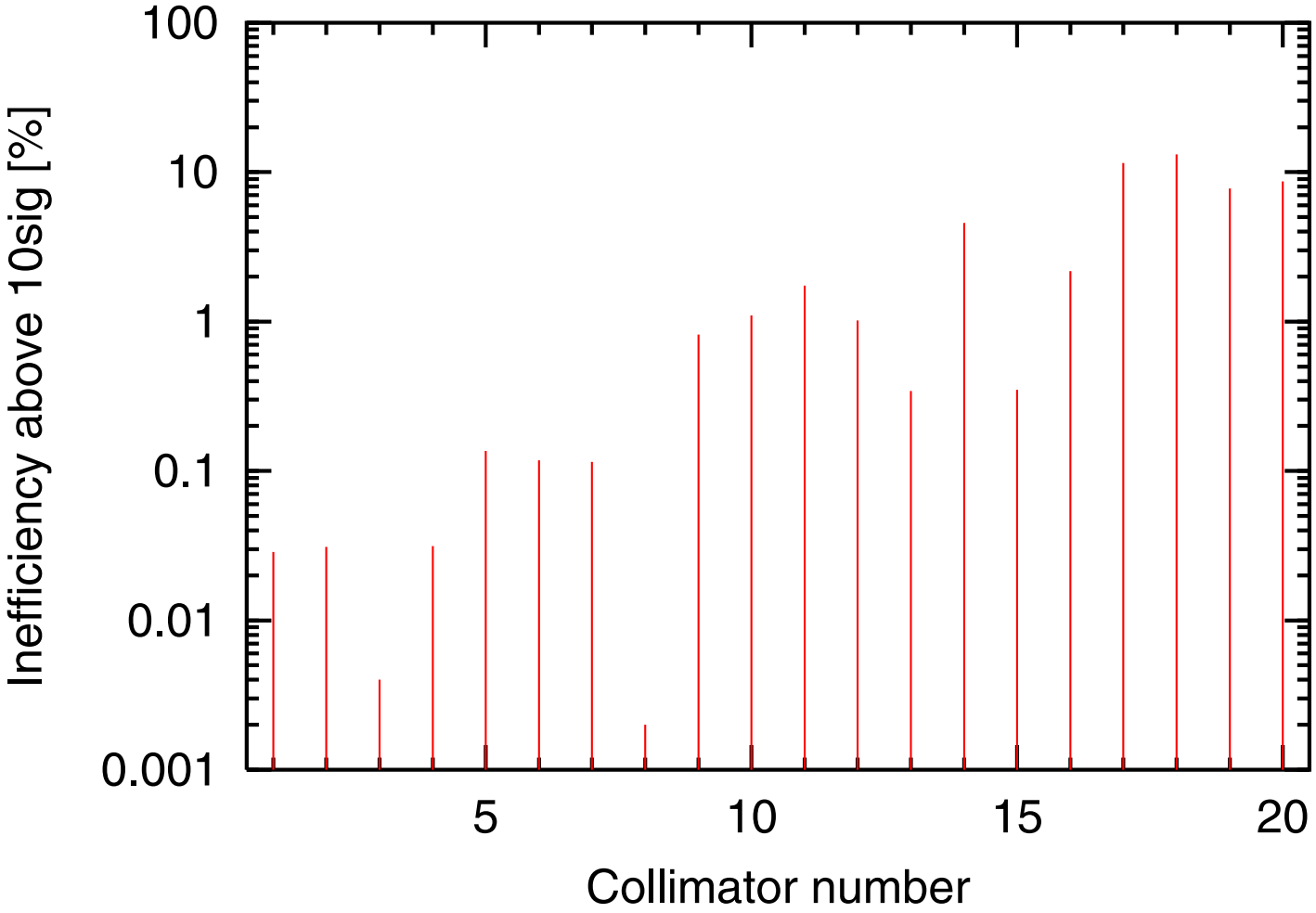
Phase space cuts have been calculated for x, to be summarized.

We need to check the downstream equipment!

Simple estimates for Alfredo (Oliver, Luca?).
More detailed study by Martha…

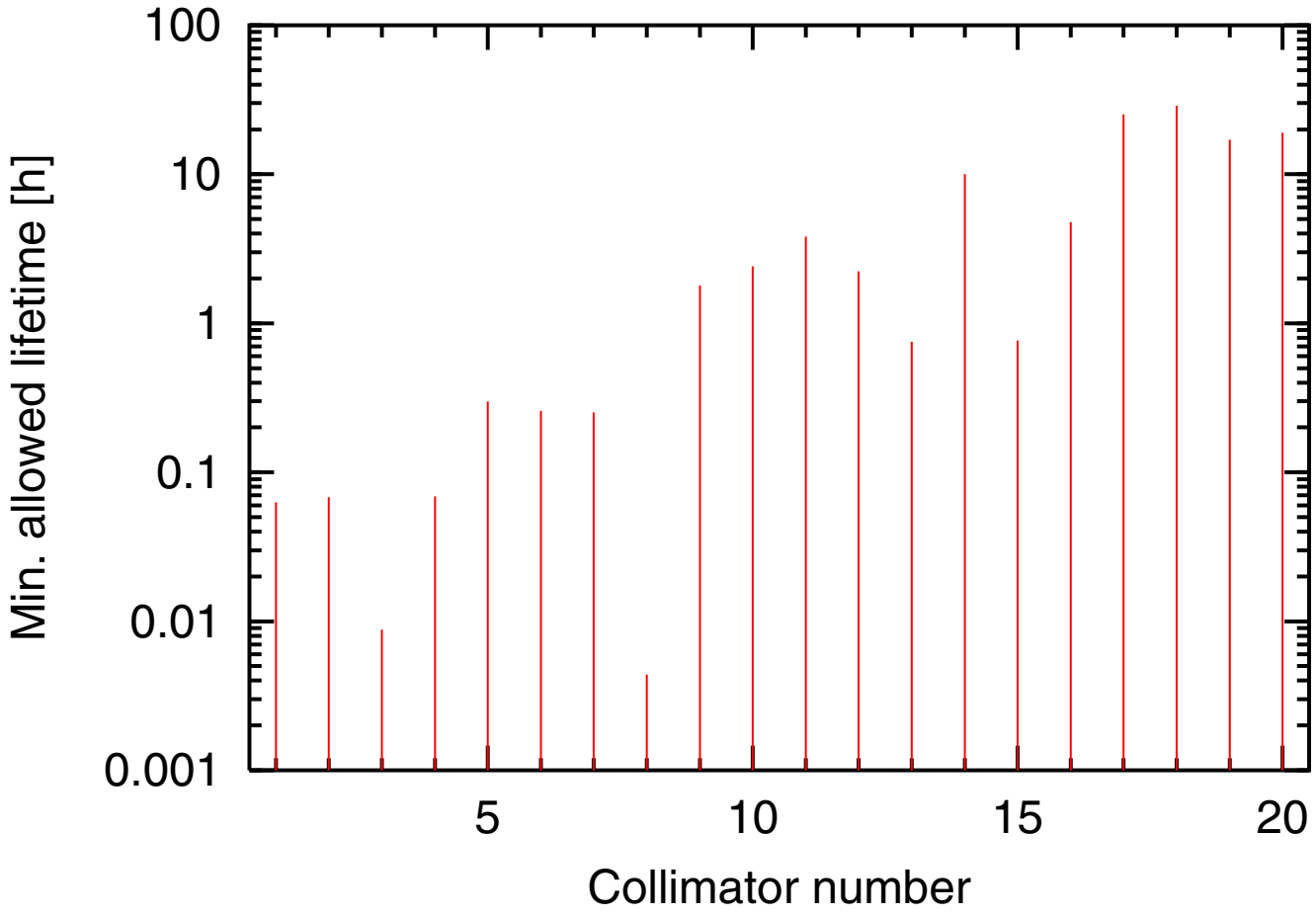
2) Loss rates per collimator (0.2 m C, 0.5 m Cu)

Inefficiency for impact at a given collimator (pencil beam 0.5 μm):



Loss in efficiency as secondary collimators act as primary collimators!

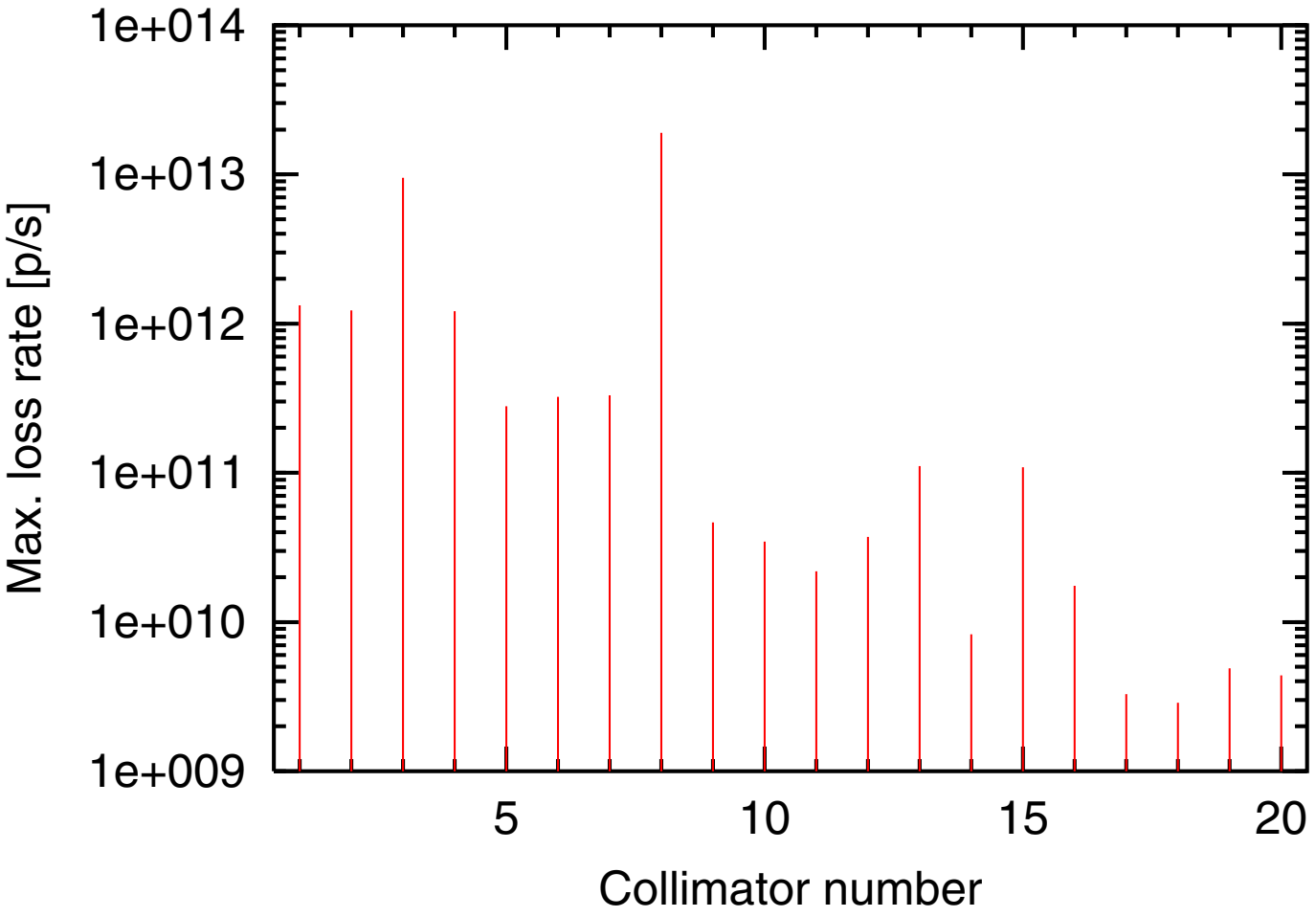
From inefficiency, nominal intensity, quench limit specify min allowable lifetime:



Compare to specification of 0.2 h for 10 s, 1 h for minutes (cont)

Some secondary collimators cannot fulfill requirement: lower loss rates! Shorten others to ensure lower loss rates? Play with jaw lengths…

Maximum loss rates without quench and beam dump:



Conclusion from study of loss rates per collimator:

We could try to reduce specified loss rates for Cu secondaries by factor of about 10!

We could still argue that it is possible to run at the quench limit.

Would require reduced length for first 4 collimators to ensure that loss rates are not exceeded (need interlock otherwise).

Use same “trick” for C-C secondary collimators.

Small losses in cleaning efficiency and reduction in impedance!?