

# New Thoughts on BDS MPS

PT, 9 June 1998

1. New approach to cataloging BDS MPS hits
2. MAID, impact angle, and beam size
3. What next?

*“They try to tame you, looks like they’ll try again”*

New Approach:

Following a suggestion by Dieter Walz, consider the MAID (how far off a quad or bend has to be) *and* the angle of incidence on downstream component

Depending on the angle and the location of the hit, one of several things might happen:

- The beam might not burn up the vacuum chamber, but still have enough energy density to burn up the surrounding magnet
- The beam might burn up the vacuum chamber and the magnet
- The beam might burn up the vacuum chamber but be too spoiled to burn up a magnet
- The impact might be completely benign.

The distribution of possible impacts into the categories above has some bearing on the complexity of the MPS system

MAID, impact angle, beam size

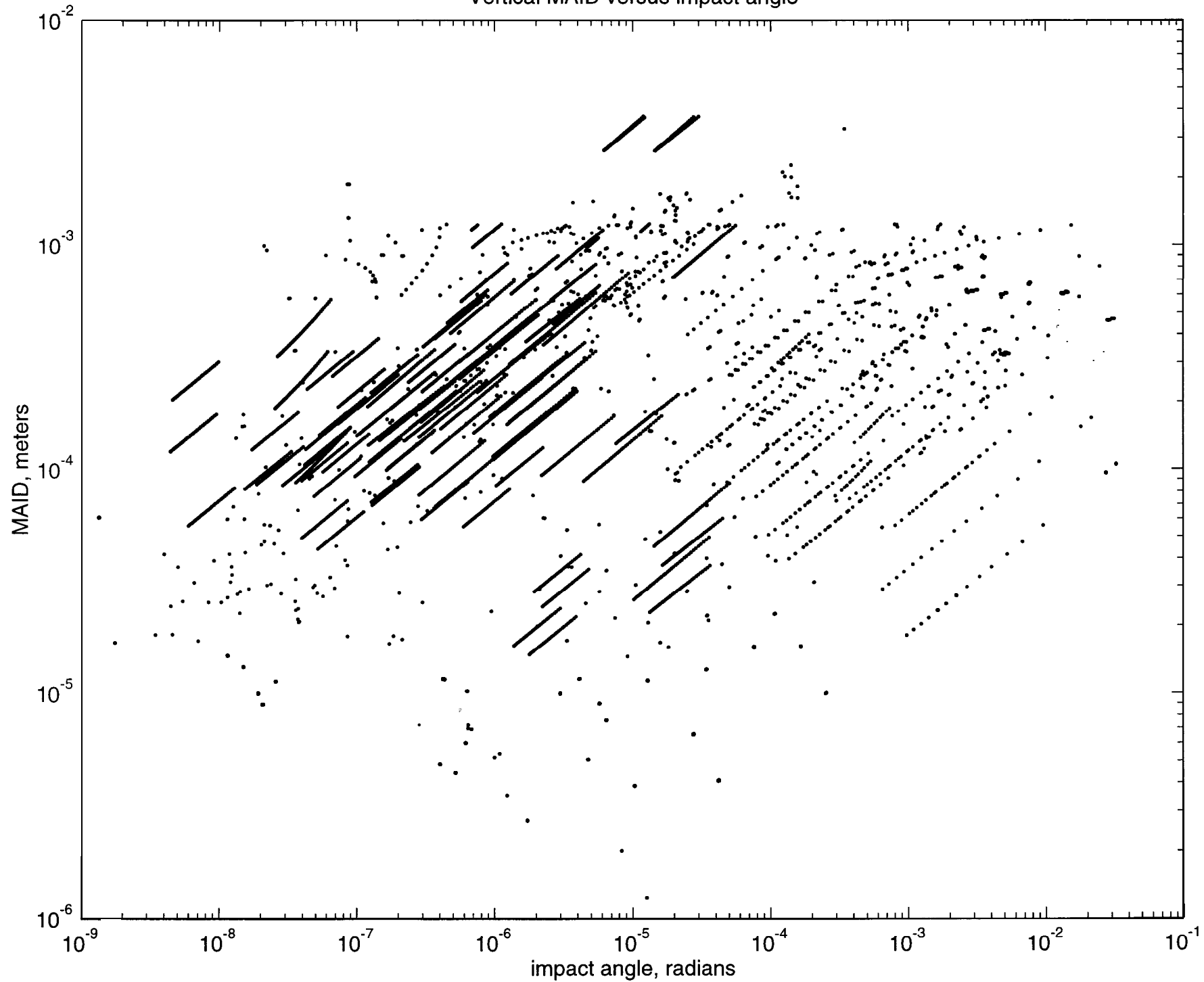
In order to study the possible cases of MPS incidents in BDS, all possible excursions due to a single-element failure were catalogued, assuming the following:

- Max quad excursion is  $\sim a/4$  (re M. Gyr's paper)
- Max bend excursion is 100% of its field
- If a quad with excursion of  $x$  hits an element at location  $z$ , then magnets downstream of  $z$  can only be hit if the needed excursion is  $< x$

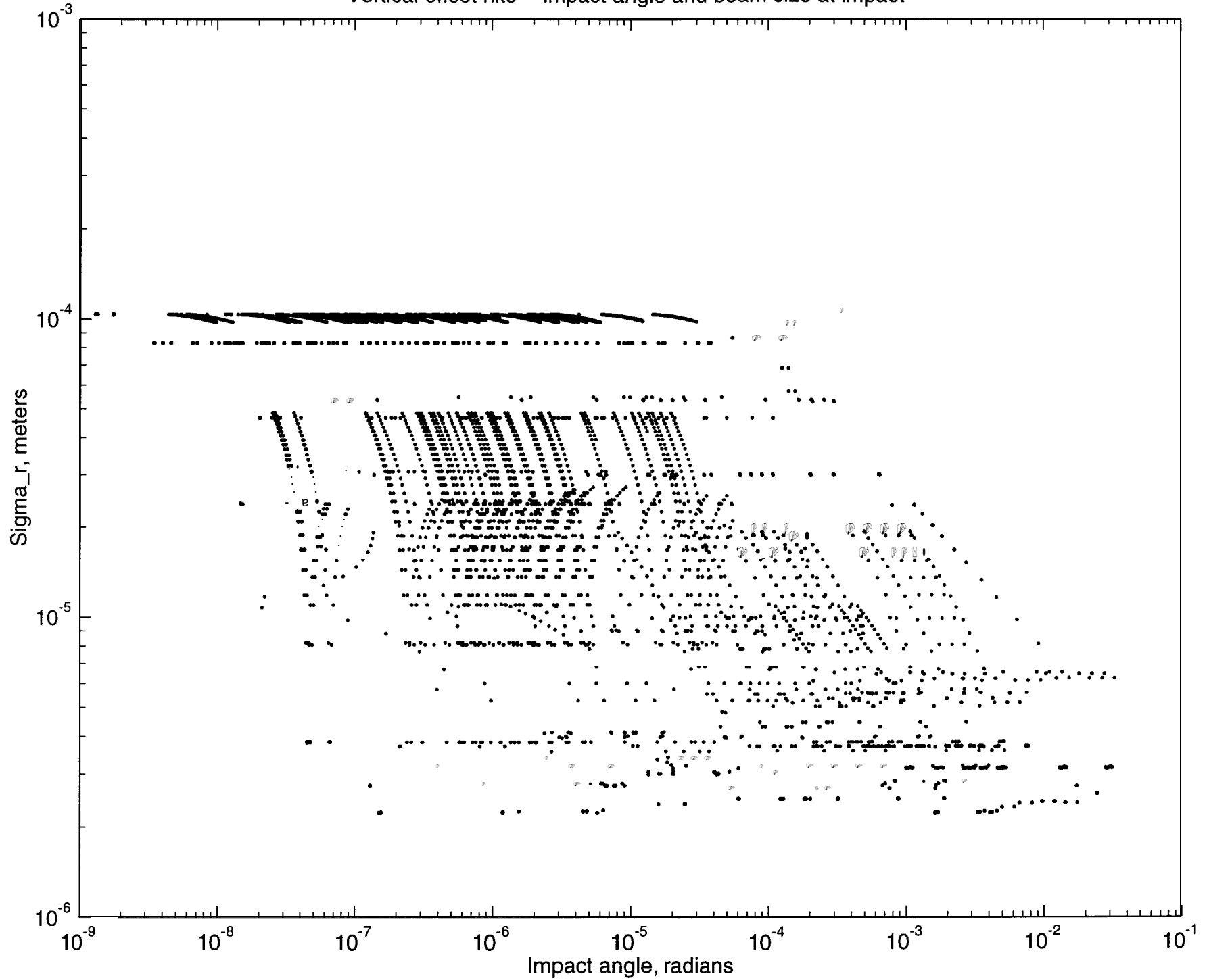
The total number of hits was found to be  $\sim 11,000$  (not bad considering the combinatorics).

In each case the MAID, incident angle, and beam size at target were saved.

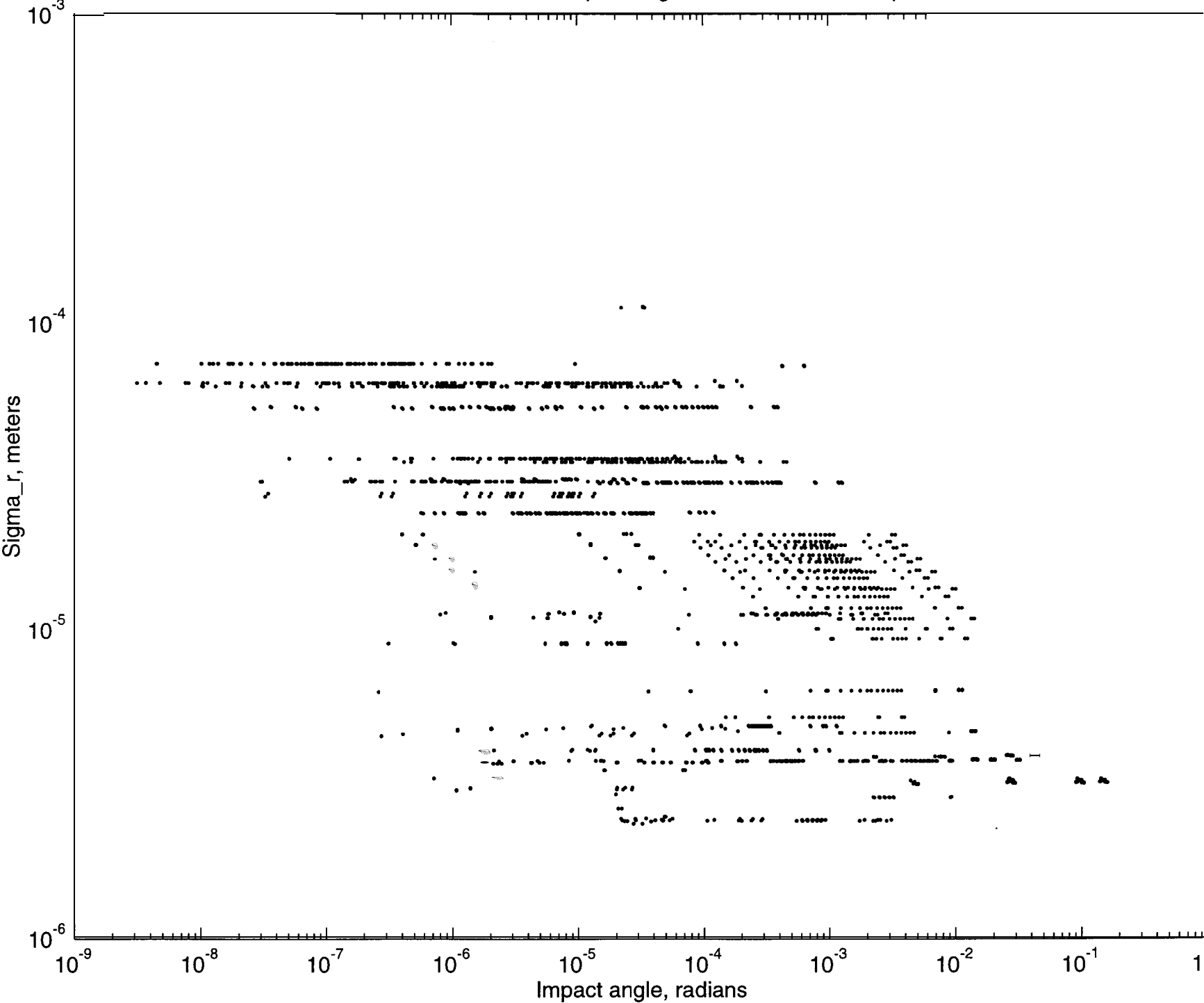
Vertical MAID versus impact angle



Vertical offset hits -- impact angle and beam size at impact



Horizontal offset hits -- impact angle and beam size at impac



What is next?

Need to determine what the “damage contours” are on the plots of angle versus beam size – which combinations of angle and beam size are benign, which are “blow-outs,” which will burn up a magnet

This in turn will tell us something about what the active magnet protection has to do, and which cases we can ignore (they then become BCS problem)