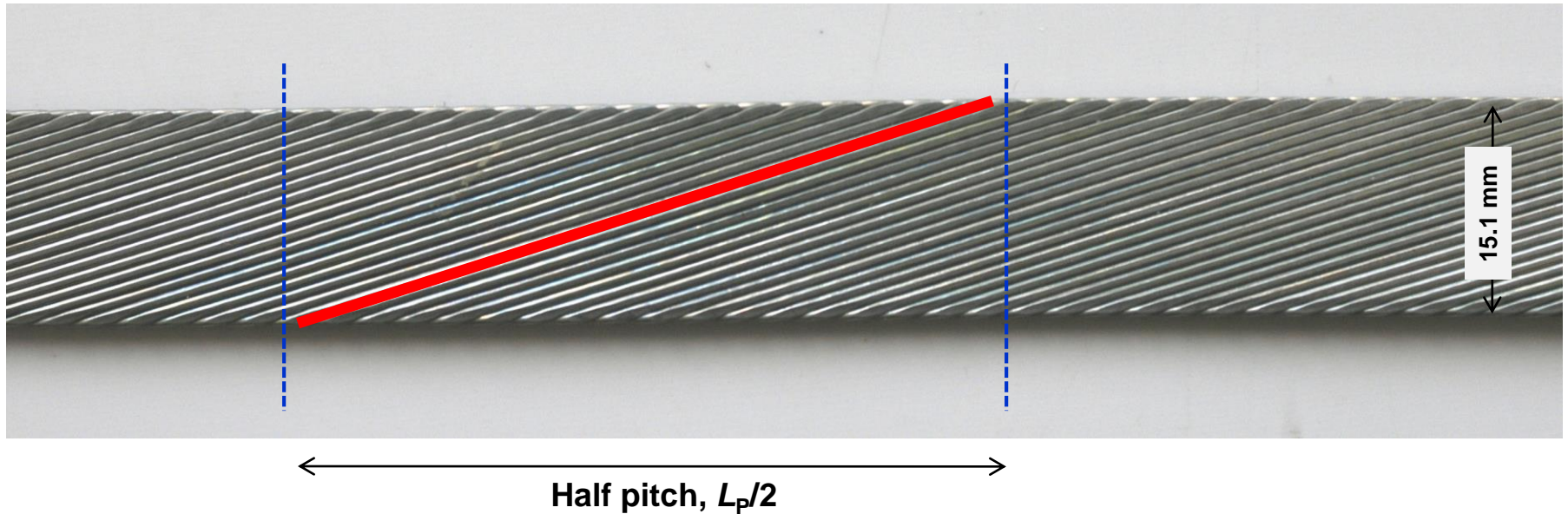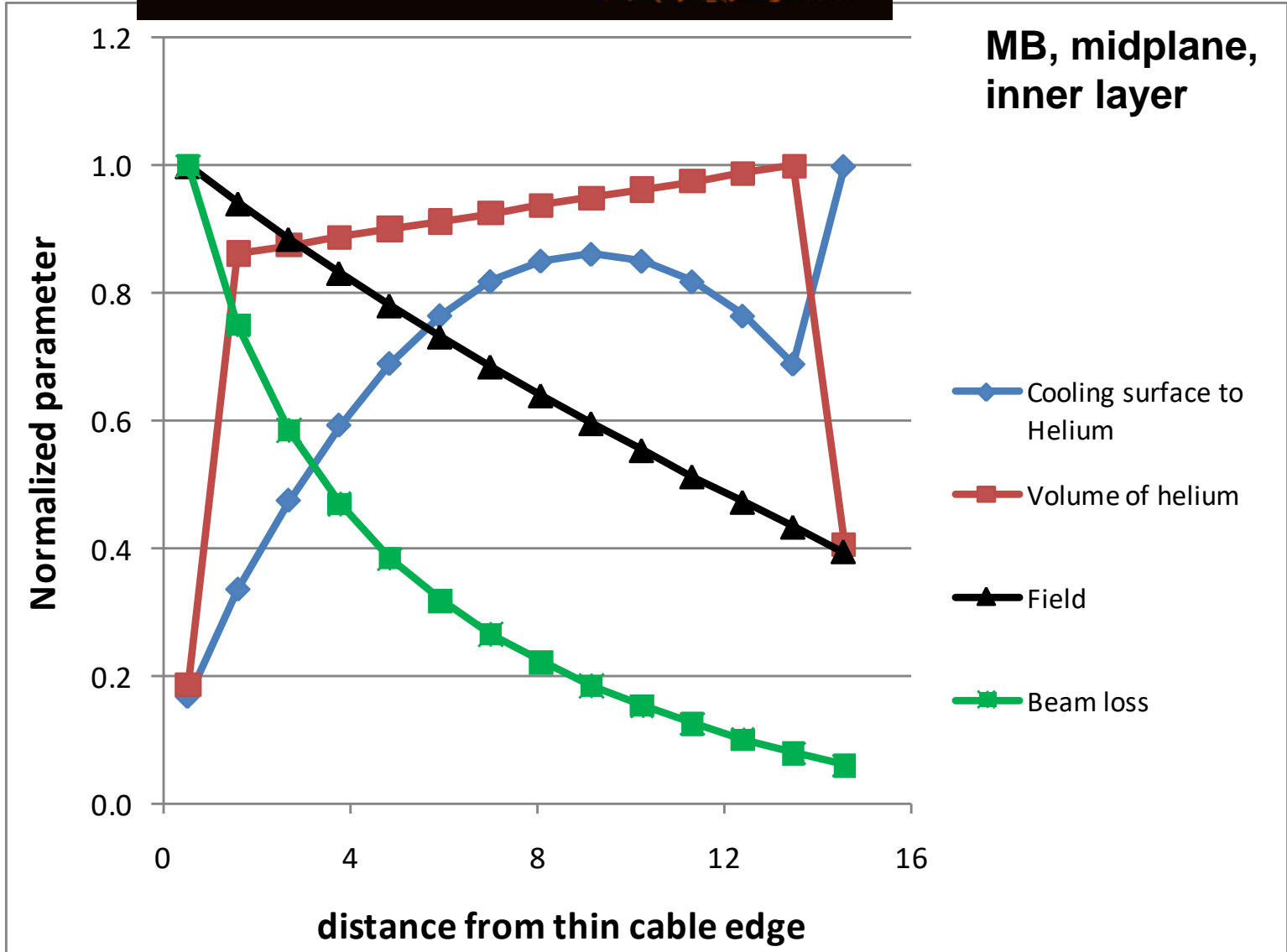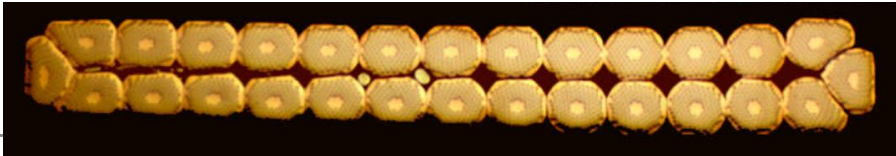# Quench thresholds for the MB and MQ using the code QP3

Arjan Verweij, TE-MPE

Modeling the geometry

Considering the high contact resistance between the strands in a Rutherford cable, the response of the superconductor due to a beam loss stretching over several meters can be modeled by a single strand with a length of half the cable transposition pitch, and symmetry lines at both ends.

15.1 mm

Half pitch, $L_P/2$

MB, midplane, inner layer

Variations over the cable width

- Cooling surface to Helium
- Volume of helium
- Field
- Beam loss

Normalized parameter

distance from thin cable edge

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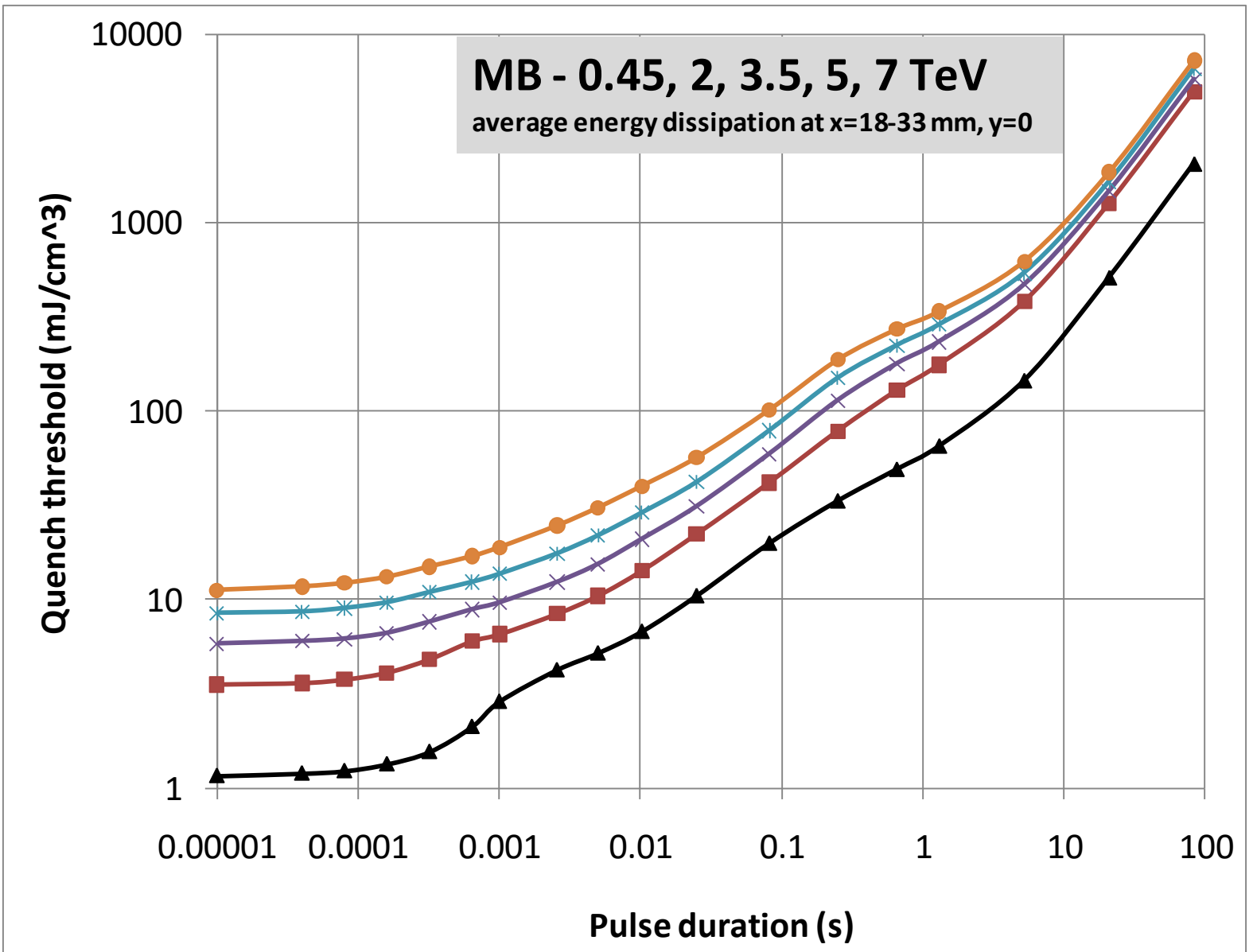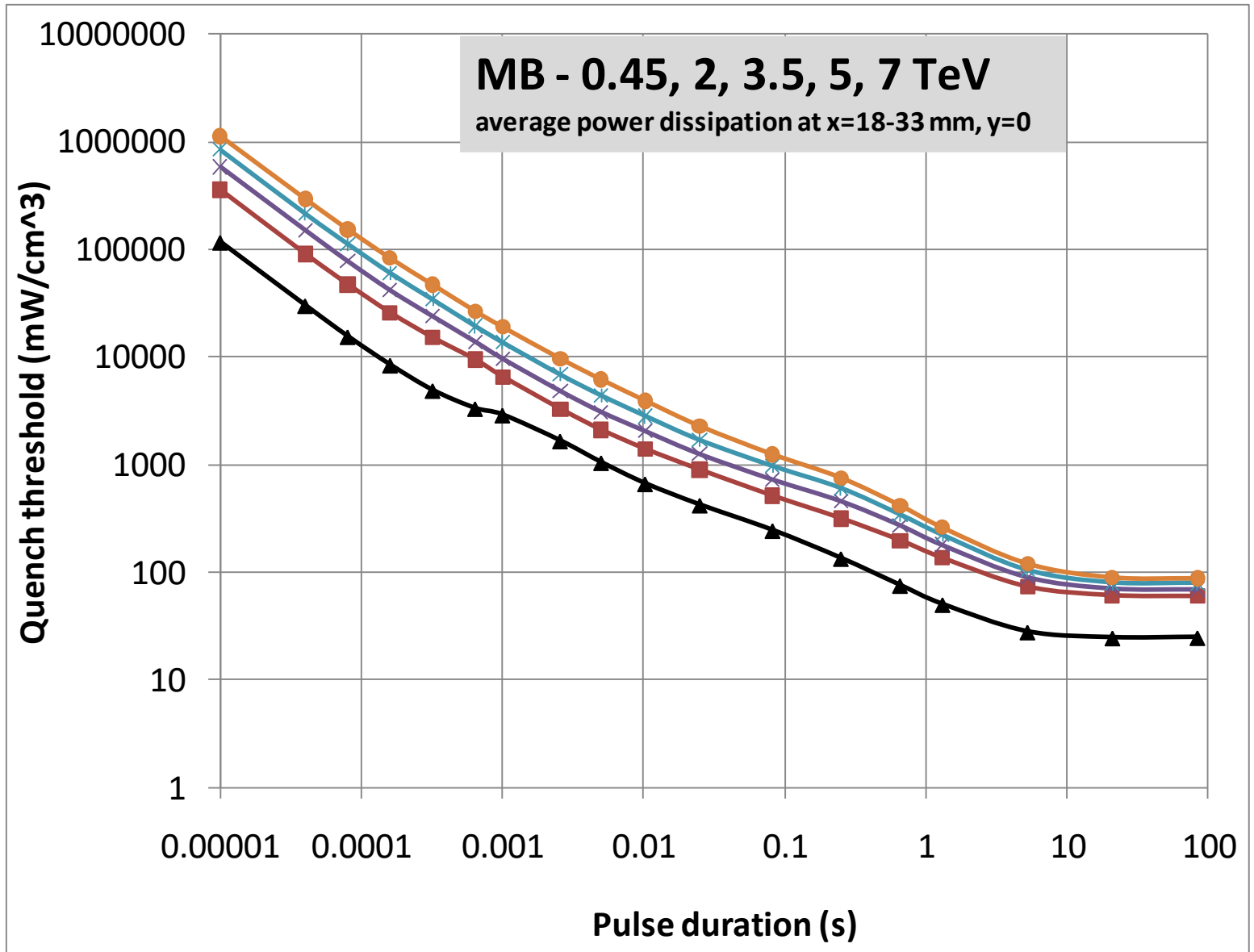
Results

Calculations performed for:

 - beam dissipation distribution taken from note 422.

 - the midplane inner layer cable of the MB and MQ magnets.

 - 18 pulse lengths, from 10 μs to 84 s, including the 12 integration
    times used for the BLM's.

 - 5 currents, corresponding to 0.45, 2, 3.5, 5, 7 TeV.

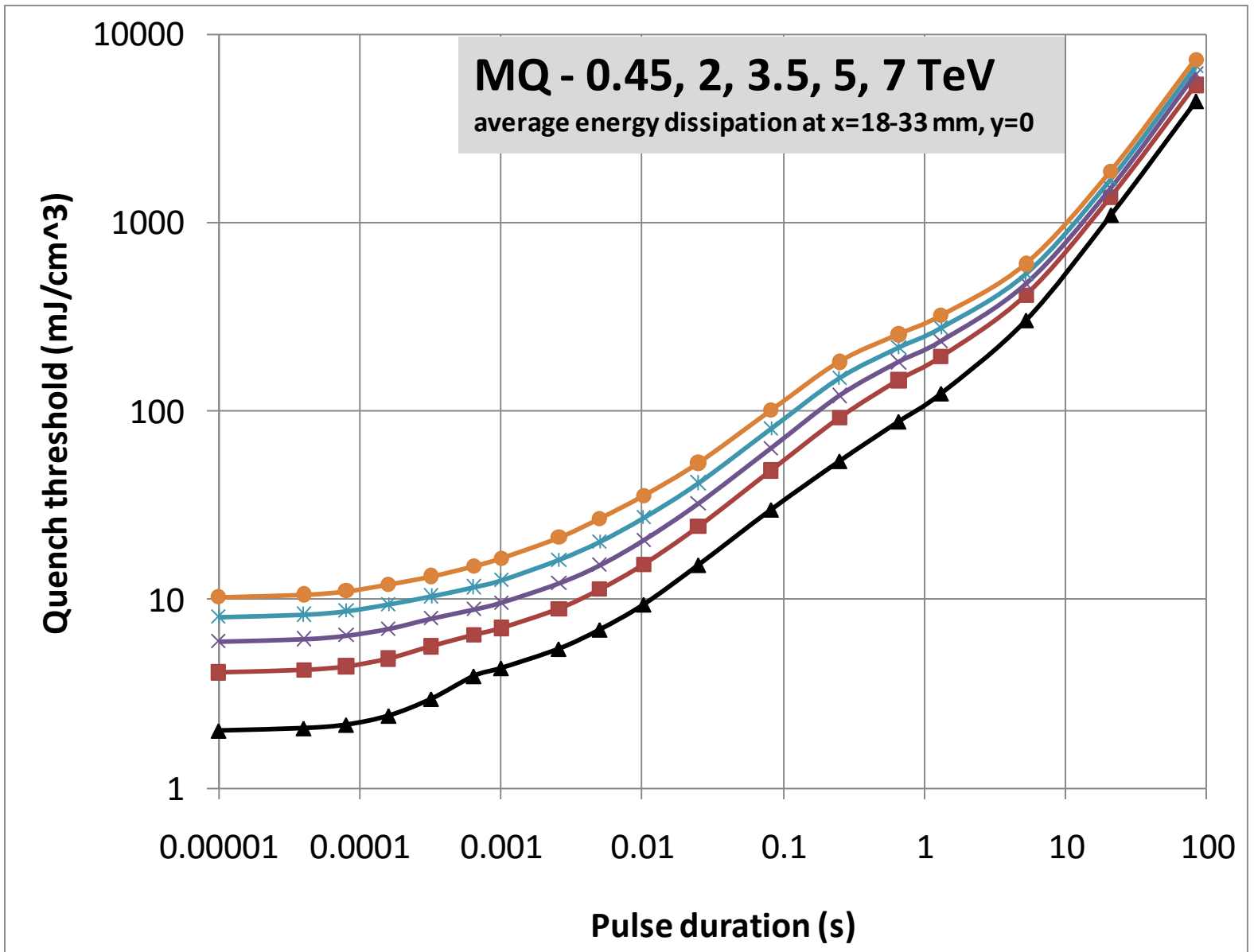Results given for:

 - Energy vs pulse duration

 - Power vs pulse duration

both <u>averaged</u> over the width of the conductor.

MB - 0.45, 2, 3.5, 5, 7 TeV
average energy dissipation at x=18-33 mm, y=0

Quench threshold (mJ/cm^3)

Pulse duration (s)

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MB - 0.45, 2, 3.5, 5, 7 TeV
average power dissipation at x=18-33 mm, y=0

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MQ - 0.45, 2, 3.5, 5, 7 TeV
average energy dissipation at x=18-33 mm, y=0

A. Verweij, TE-MPE. 26 Nov 2010, MPP meeting

MQ - 0.45, 2, 3.5, 5, 7 TeV
average power dissipation at x=18-33 mm, y=0

Next magnets:

D3 & D4: do we have realistic beam loss distribution or do we use the same as MB and MQ ?

and/or:

MB and MQ with different beam loss distribution