Lattice Updates

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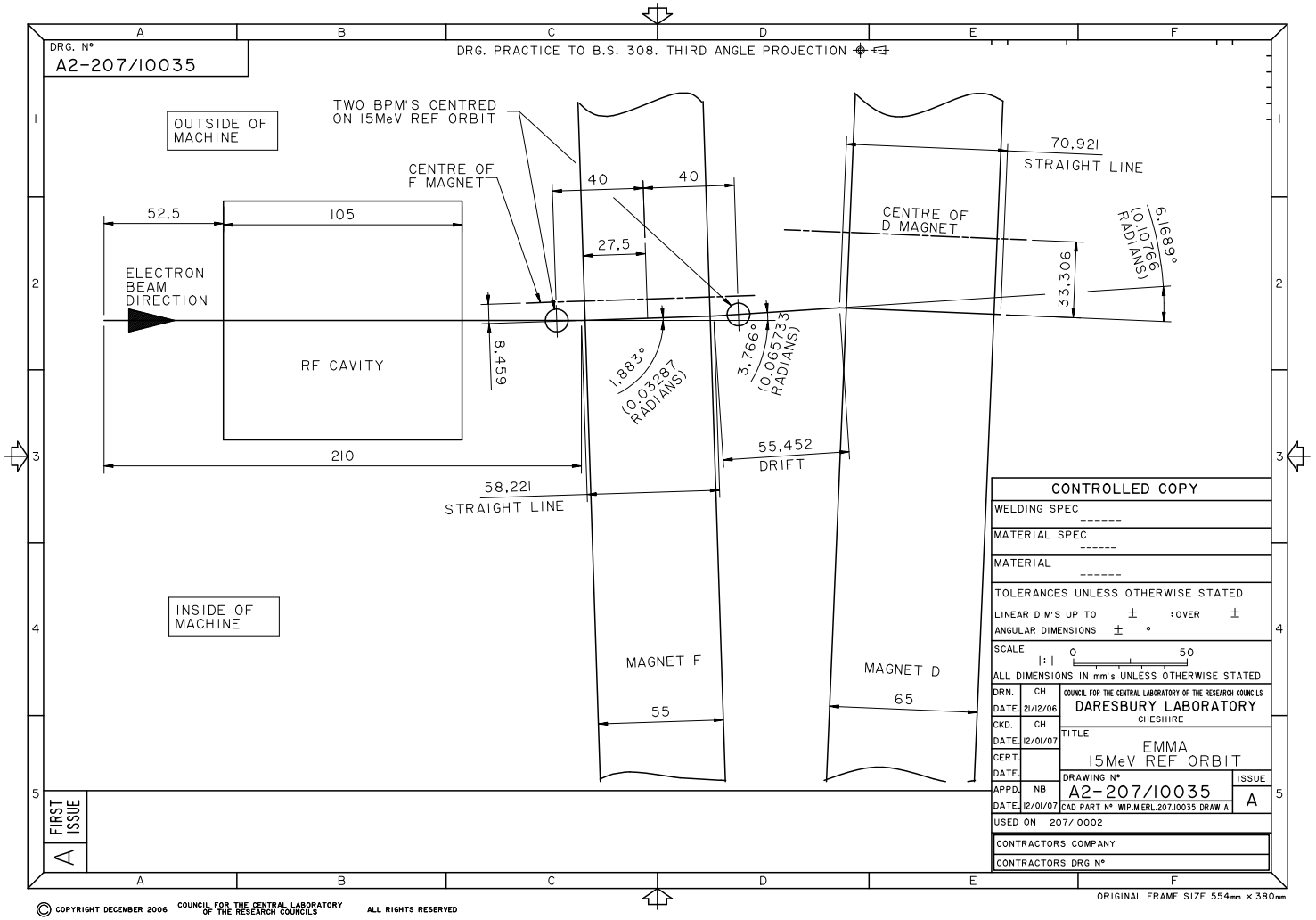
Outline

- Making magnets parallel
- Reduction in requirements for parabola shift
- Cavity aperture

Making Magnets Parallel

- Previous design had magnets at an angle to each other
- There was significant interest in making the magnets parallel
  - Coils won't be as close together
  - Assembly of module easier?
  - Magnetic field computation easier?

Magnets Not Parallel



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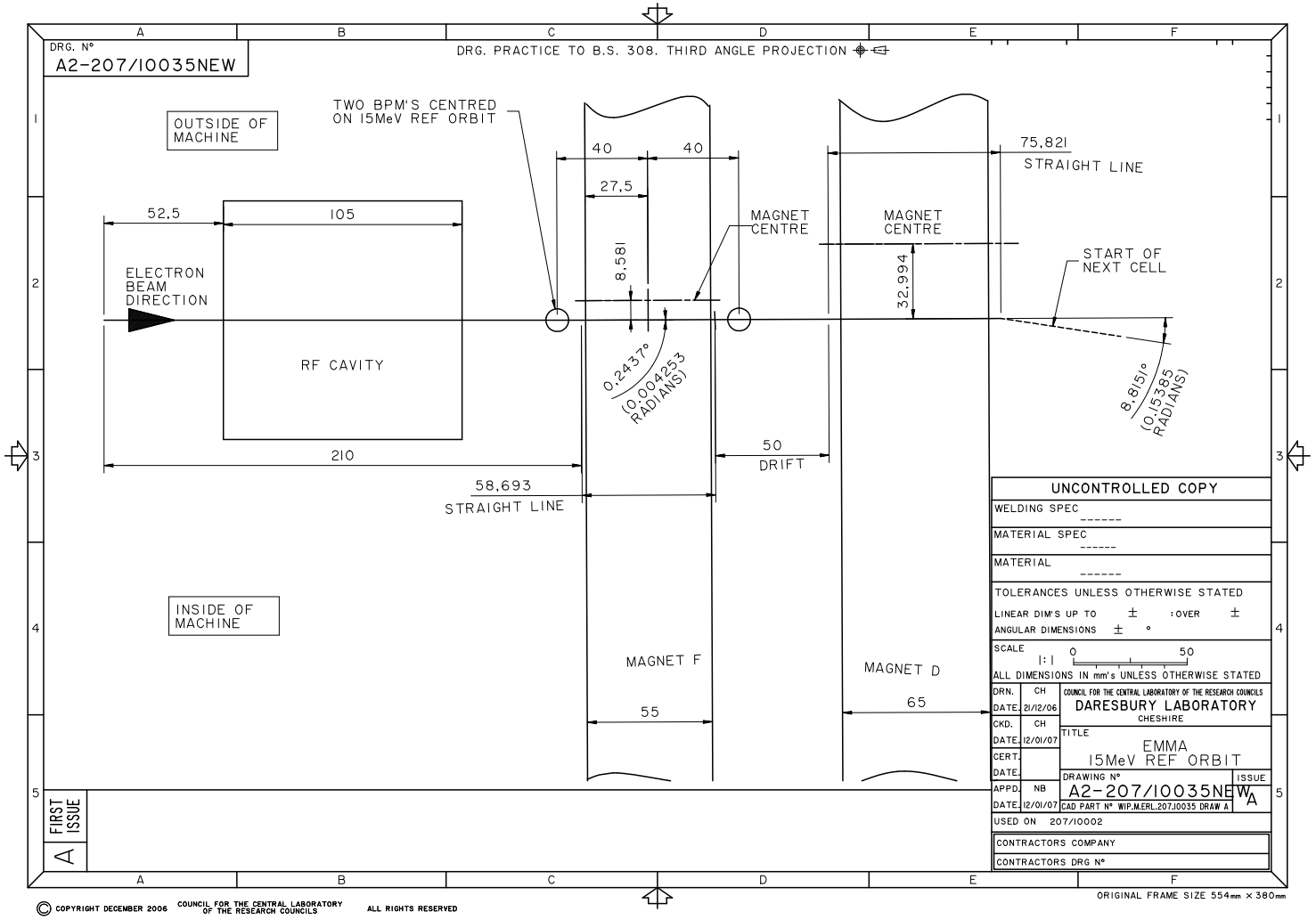
Magnets Parallel



Making Magnets Parallel
Geometry

	Before 061213a	After 070113b
Long drift (mm)	210.000	210.000
F entrance angle (mrad)	-32.867	-4.253
F length (mm)	58.221	58.693
F exit angle (mm)	-32.867	0.000
Short drift (mm)	55.452	50.000
D entrance angle (mrad)	107.666	0.000
D length (mm)	70.921	75.821
D exit angle (mrad)	107.666	153.853

- Note very small F entrance angle: chosen to make 15 MeV orbit go down cavity axis (make cavity parallel also?)
- Short drift length set to 50 mm; could have done this before

Making Magnets Parallel
Pipe and Magnet Apertures

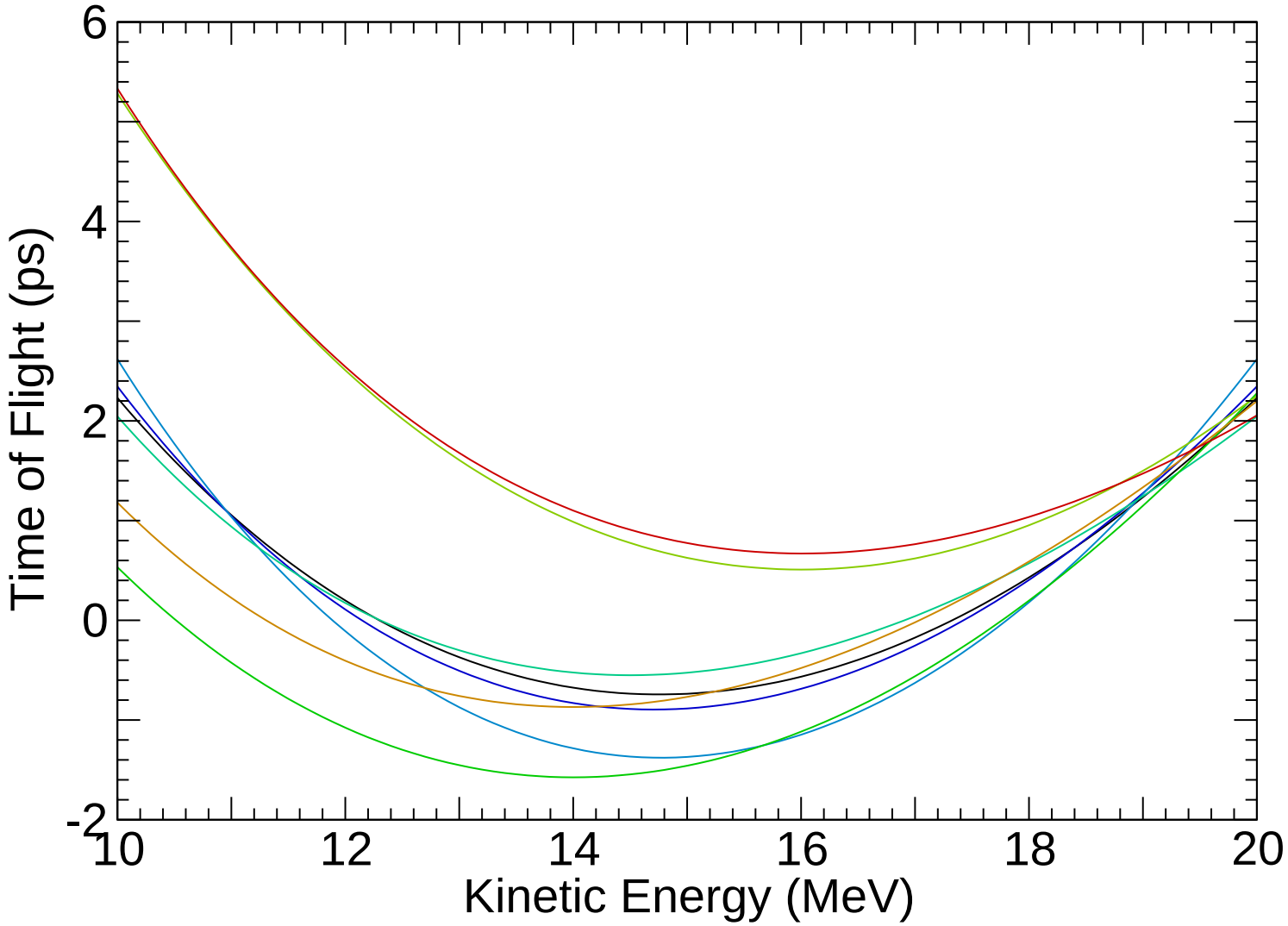
	Before 061213a	After 070113b
Cavity aperture (mm)	34.374×10.597	34.725×10.570
D Pipe (mm)	24.327×11.722	24.936×11.685
F Pipe (mm)	41.955×8.874	42.280×8.913
D Quad Max (mm)	60.120	59.253
F Quad Max (mm)	32.166	33.389

- No appreciable aperture increase in making magnets parallel

ToF Parabola Minimum Shifted

- When shifting time of flight parabola minimum, need extended frequency range to synchronize RF to any energy
  - I didn't give parameters to synchronize to every energy before
  - Probably because you wouldn't want to run that way
  - However, for commissioning, almost certainly want to synchronize RF to injection energy to find injection orbit
- Turns out that configurations requiring largest frequency shift also require largest magnet apertures
- More frequency range means lower gradients
  - I think we are more interested in having larger gradient
- Back off requirement for parabola shift
  - Minimum at 15.5 MeV instead of 16 MeV

ToF Parabolas

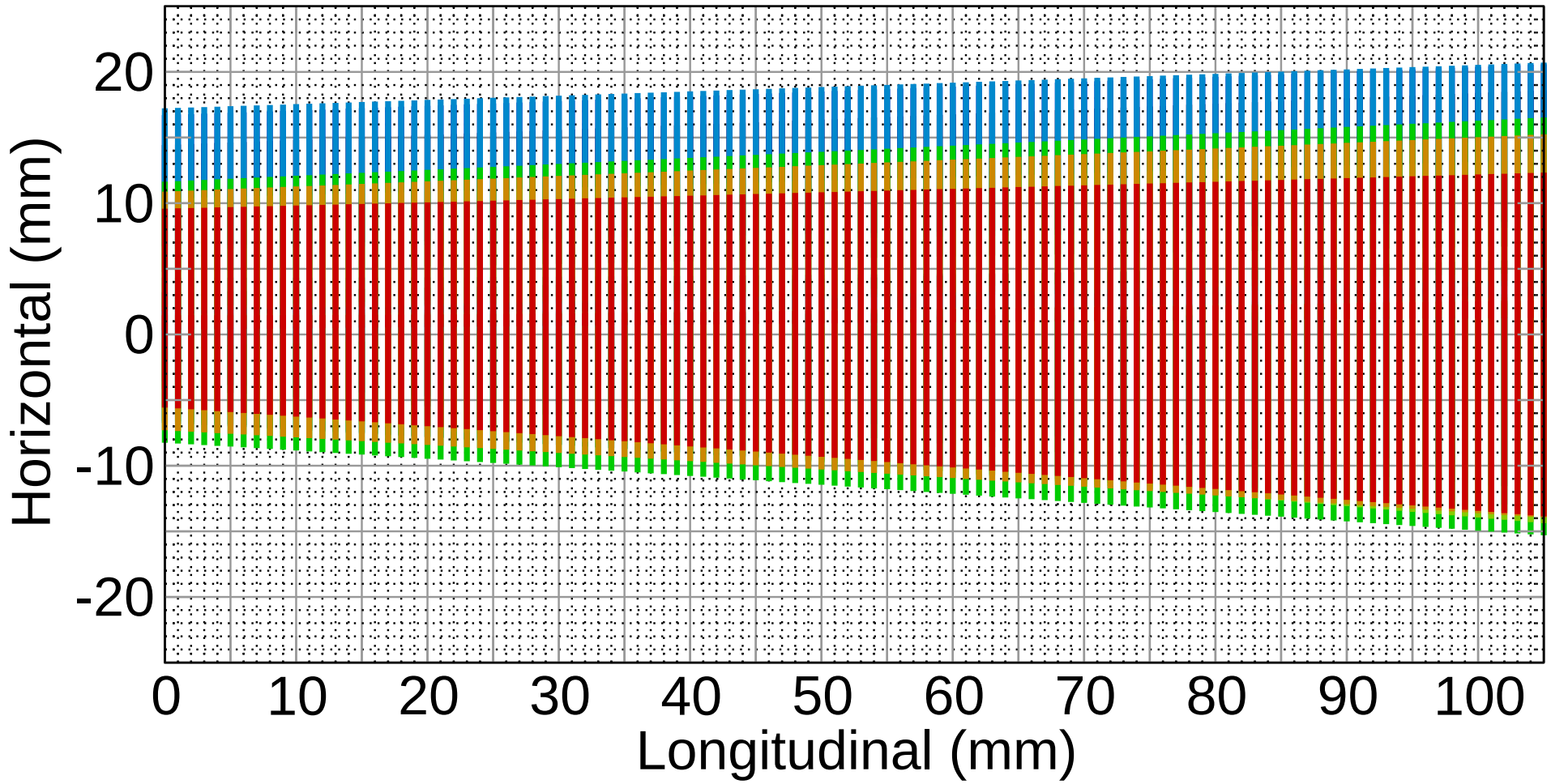


Reduced ToF Parabola Shift

	16 MeV	15.5 MeV
D Quad Max (mm)	59.253	54.621
F Quad Max (mm)	33.389	31.804
Frequency Range (MHz)	6.790	5.582

- Modest reduction in vertical magnet apertures also

Cavity Aperture

- All cavity apertures are based on 105 mm cavities, centered in 210 mm drift
  - Previously, used 175 mm cavitiies
  - Had larger apertures
- Currently required diameter is 35 mm (tight)
- Shifting cavity toward D quad reduces aperture
- Could make apertures asymmetric

Beam Width in Cavity