

Dynamic aperture vs tune

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Background

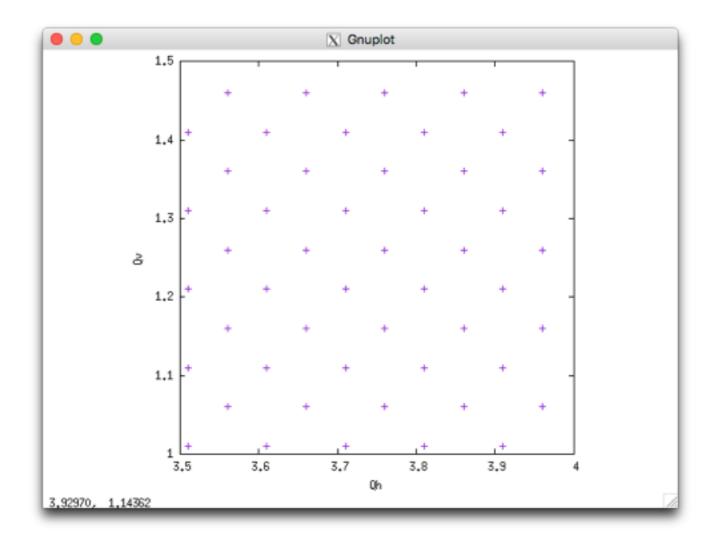
Facilities Counci

- Malek showed a results of dynamic aperture (DA) vs kinetic energy.
- Figure 0 Is there correlation between DA and tune? 0 3.82 3.8 3.78 3.76 lanc. 3.74 91 MeV -> 11 MeV 3.72 700 3.3 650 epsy=0mm.mrad 3.68 horizontal tune epsy=1mm.mrad epsy=2mm.mrad 1.64 600 DA norm (mm.mrad) 1000 epsy=3mm.mrad tars number 550 Figure 0 1.46 vitane 500 1,44 91 MeV -> <- 11 MeV 450 1.42 1.4 400 **MIN** 1.38 350 1.36 80 90 20 30 40 50 60 70 100 10 1.34 Kinetic Energy (MeV) 1.32 vertical tune 10000 15000 20000 torn name ogy

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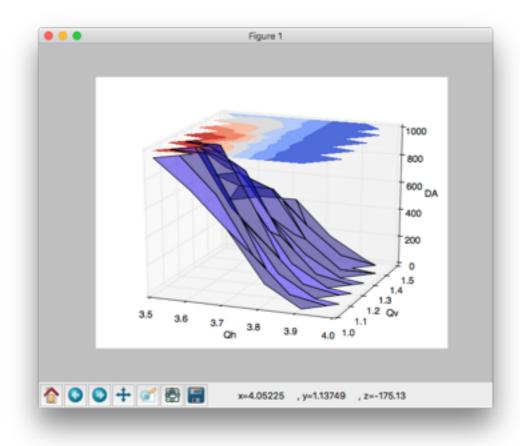
DA definition

- Use hardedge FFAG
- Survival of 1000 turns
- Vertical amplitude is fixed
 - 1 pi mm mrad
- At 11 MeV



Scan at grid points





Tune scan result

Less sensitive with Qv.

DA decreases with Qh.

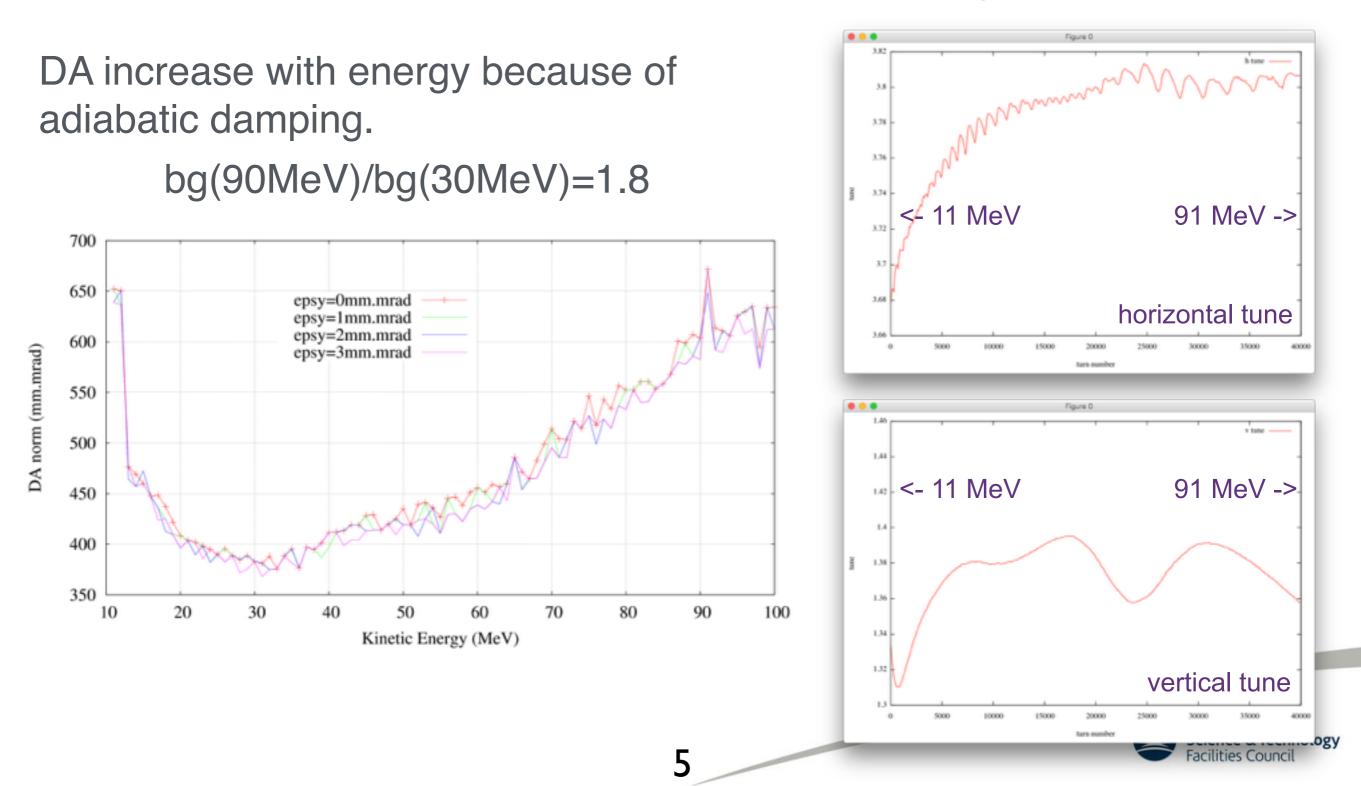
... Figure 1 ... Figure 1 1000 000 800 800 600 600 DA DA 400 400 200 Qh 1.0 ^{1.2} Qv ^{1.3} 1.1 3.7 3.8 Oh 4.01.0DV 1.4 3.5 3.6 3.9 1.5 🏠 🔾 😜 🕂 🧭 🖶 🟠 🔾 😜 🕂 🕥 🚯 🔚 x=4.09843 , y=1.00111 , z=543.561 x=3.49607 , y=1.22352 , z=424.962

c.f. ~ 600 pi at Qh=3.7, agree with TOSCA tracking.



Interpretation

DA becomes minimum around 30 MeV because of high Qh.



Summary

 Trend of dynamic aperture vs energy is almost explained by tune dependence.

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- Tune scan with finer grid points is running.
- Tune scan with wider tune space is running.

