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## Fermilab Booster beam emittances from quadrupole modes measured by BPMs

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The measurement of beam emittances by extracting the quadrupole mode signal from a 4 plate BPM was published at least 40 years ago. Unfortunately, in practice, this method suffers from poor signal to noise ratio and requires a lot of tuning to extract out the emittances. In this paper, an improved method where multiple BPMs are used together with better mathematical analysis is described. The BPM derived emittances are then compared with those measured by the Ion Profile Monitor (IPM). Surprisingly, the BPM measured emittances behave very well and are more realistic than those measured by the IPM.

### Footnotes

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**Primary author:** TAN, Cheng-Yang (Fermi National Accelerator Laboratory)

**Co-author:** BALCEWICZ, Michael (Fermi National Accelerator Laboratory)

**Presenter:** BALCEWICZ, Michael (Fermi National Accelerator Laboratory)

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