ATF2 Optics for the Commissioning

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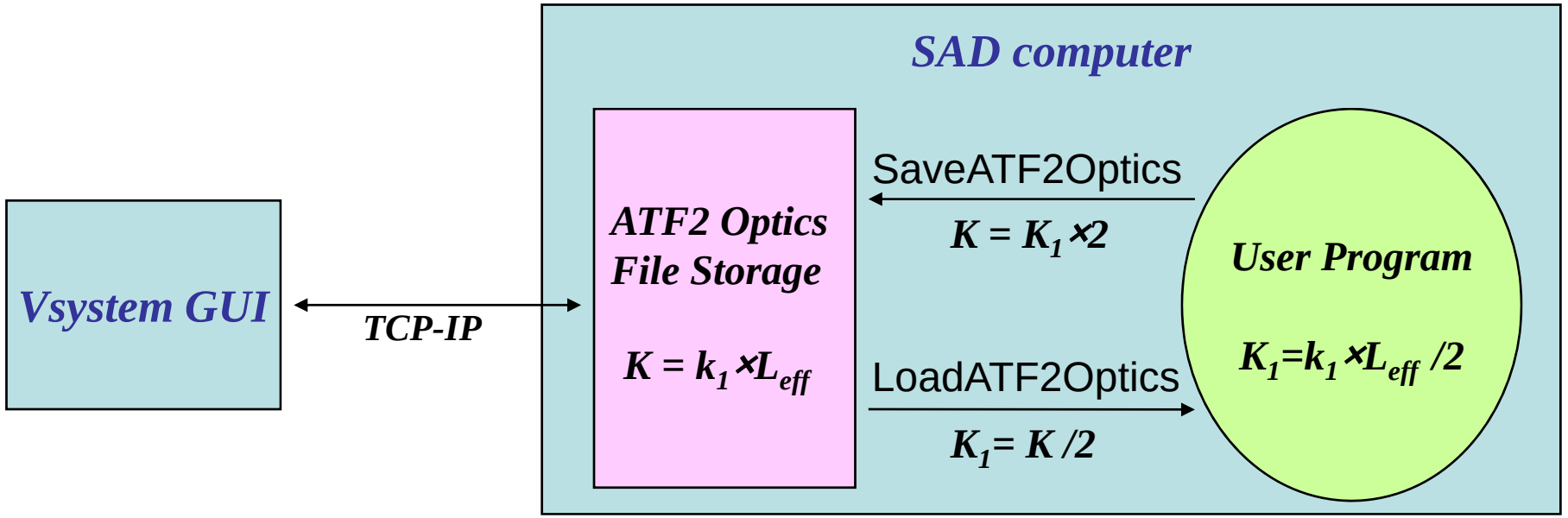
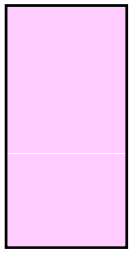
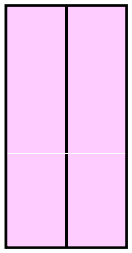
ATF2 commissioning meeting

SaveATF2Optics and LoadATF2Optics Command





Quadrupole definition of old extraction line



Quadrupole definition of ATF2 beamline

Example of the ATF2 optics calculation for SAD

```
! --- ATF2 optics deck
 read "/users/atfopr/sad/atf2daihonnew.sad";

 FFS USE=ATF2;

! --- Library for “Load” and “Save” command
 Get["/users/atfopr/sad/atf2lib.n"];

! --- Ver4.0 Design Optics
 LoadATF2Optics[“ATF2V40design”];

! --- Optics for Radiation Inspection
! LoadATF2Optics[“ATF2Radiation”];

! --- High Beta Optics
! LoadATF2Optics["ATF2HighBeta"];
 cal;
 end;
```

Format of the optics file

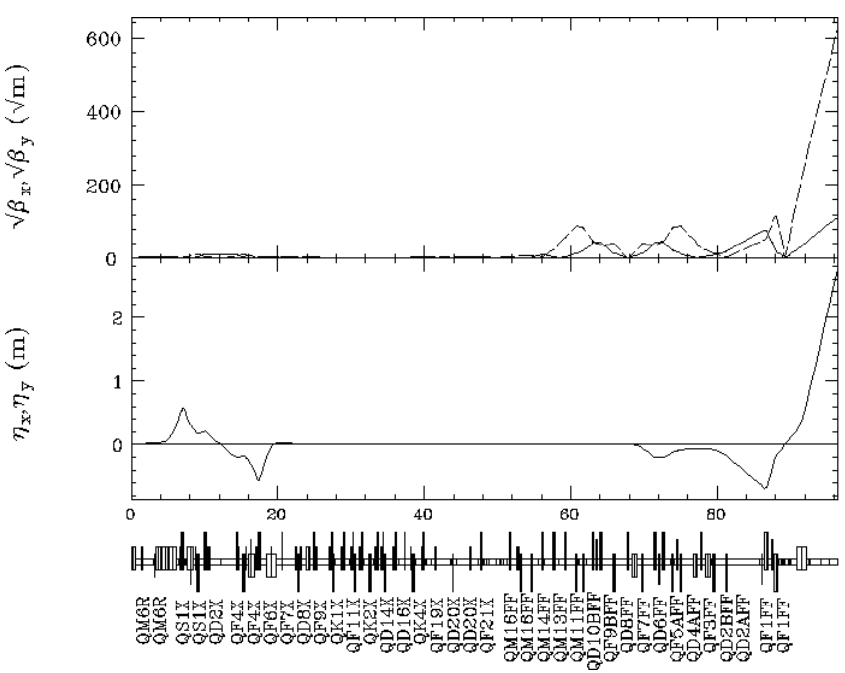
Directory of optics file storage; ***/users/atfopr/sad/ringoptics/***

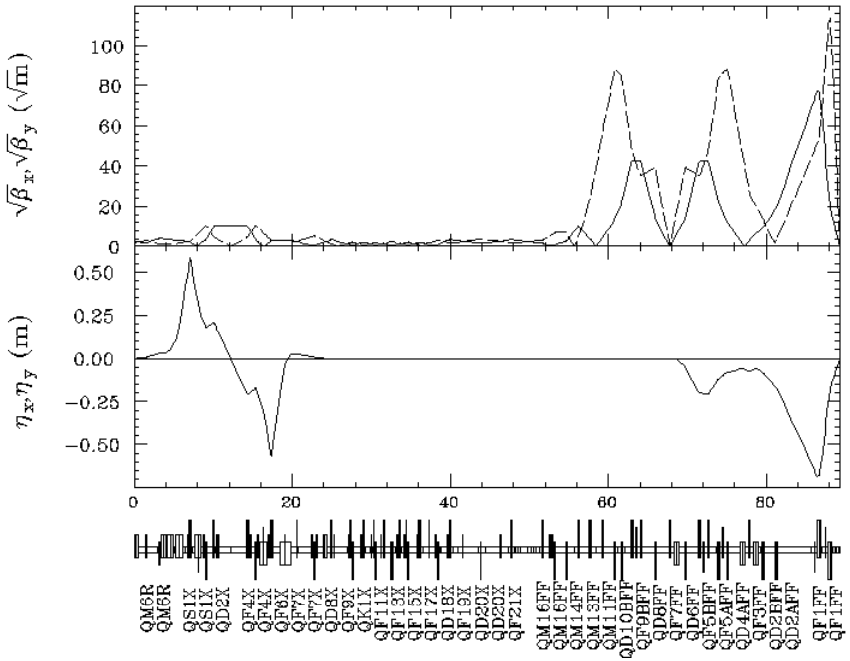
Format of the file;

```
qvatf2={{"QM6R",-.7117400000008},{"QM7R",.4082199999958},{"QS1X",0},{"QF1X",1.07347314146},{"QD2X",-.941217293288},
 {"QF3X",.669119133753},{"QF4X",.680185709967},{"QD5X",-.926993177043},{"QF6X",1.12835182},{"QS2X",0},
 {"QF7X",.38978022796}, {"QD8X",-.589666760602},{"QF9X",.735362498617},{"QK1X",0},{"QD10X",-1.0233313538},
 {"QF11X",1.0233313538},{"QK2X",0}, {"QD12X",-1.0233313538},{"QF13X",1.368238897325},{"QD14X",-1.015436469912},
 {"QF15X",1.368238897325},{"QK3X",0}, {"QD16X",-1.0233313538},{"QF17X",1.0233313538},{"QK4X",0},
 {"QD18X",-.686072135611},{"QF19X",.655166040943}, {"QD20X",-.302269728416},{"QF21X",.301425825497},
 {"QM16FF",.565676117978},{"QM15FF",-.311605461248},{"QM14FF",-1.176031022004}, {"QM13FF",.914741672714},
 {"QM12FF",.341675086114},{"QM11FF",0},{"QD10BFF",-.290019331454},{"QD10AFF",-.290019331454},
 {"QF9BFF",.378649967733},{"QF9AFF",.378649967733},{"QD8FF",-.604355398609},{"QF7FF",.55016183691},
 {"QD6FF",-.602327211925}, {"QF5BFF",.37605663431},{"QF5AFF",.37605663431},{"QD4BFF",-.296792273617},
 {"QD4AFF",-.296792273617},{"QF3FF",.552719873686}, {"QD2BFF",-.198712968919},{"QD2AFF",-.289728096191},
 {"QF1FF",.741787852156},{"QD0FF",-1.36396800693}
};
svatf2={
 {"SF6FF",8.564561598565999},{"SF5FF",-.790868336382},{"SD4FF",14.9099871294348},{"SF1FF",-2.578002823698},
 {"SD0FF",4.311860665982}
};
zvatf2={
 {"ZH1X",0},{"ZH2X",0},{"ZH3X",0},{"ZH4X",0},{"ZH5X",0},{"ZH6X",0},{"ZH7X",0},{"ZH8X",0},{"ZH9X",0},{"ZH10X",0},{"ZV1X",0},
 {"ZV2X",0},{"ZV3X",0},{"ZV4X",0},{"ZV5X",0},{"ZV6X",0},{"ZV7X",0},{"ZV8X",0},{"ZV9X",0},{"ZV10X",0},{"ZV11X",0},{"ZX1X",0},
 {"ZX2X",0},{"ZX3X",0}};
```

If you prepare the same format of the file,
you can easily apply the magnet setting with Vsystem control.

ATF2 Ver4.0 Optics for SAD

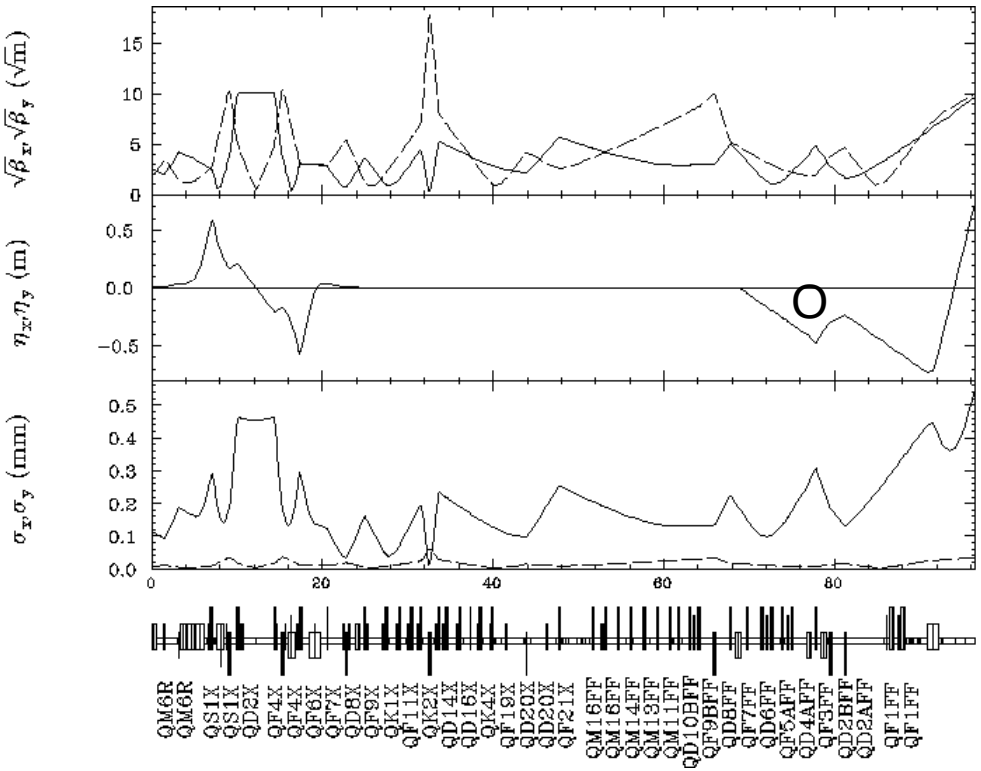




Comment for SAD deck

Since the definitions of SAD and MAD are different for the fringe field of the bending magnet, the differences of the fringe fields are compensated by the quadrupole strength in matching section (QM11FF to QM16FF) for SAD deck.

Optics for Radiation Inspection



QF1X	1.07347	QM16FF	0
OD2X	-0.94121	OM15FF	0
QF3X	0.66911	QM14FF	0
QF4X	0.68018	QM13FF	0
QD5X	-0.92699	QM12FF	0
QF6X	1.12835	QM11FF	0
QF7X	0.38978	QD10BFF	0
QD8X	-0.58966	QF9BFF	0
QF9X	0.73536	QF9AFF	0.03979
QD10X	0	QD8FF	-0.33908
QF11X	0	QF7FF	0.40865
QD12X	0	QD6FF	0
QF13X	1.33970	QF5BFF	0
QD14X	-1.18149	QF5AFF	0
QF15X	1.03310	QD4BFF	0
QD16X	0	QD4AFF	0
QF17X	0	QF3FF	0.45539
QD18X	0	QD2BFF	-0.16165
QF19X	0	QD2AFF	-0.36156
QD20X	-0.39283	QF1FF	0
QF21X	0.21813	QD0FF	0

-Only 6 QEA magnets

-Turned off the QEA magnets in extraction

-No Laser Wire and Coupling Study

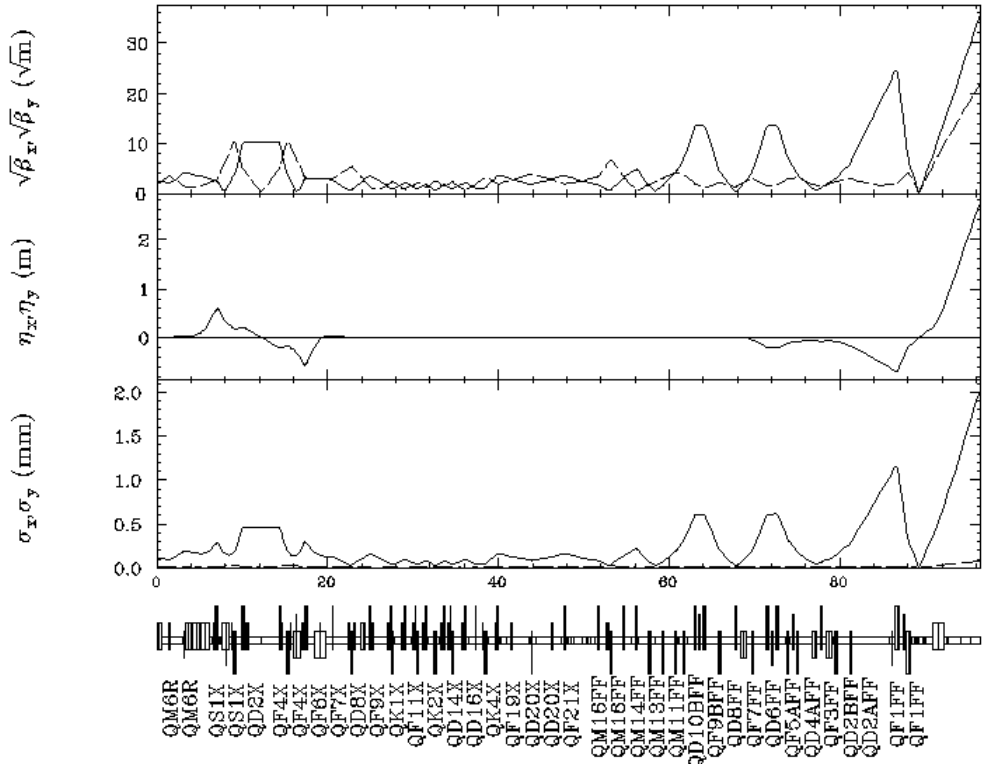
High Beta Optics

Purpose of High Beta Optics

-Turn on all magnets.

- Orbit tuning with all magnet movers.

- Make the small beam size for IP-BSM measurement



Chromatic Effect of the High Beta Optics

Sextupole ?

When the sextupoles turn on, we can make the nonlinear effect small after the tuning of the beam orbit correction at sextupoles.

But, it make some possibility to make beam size growth by the sextupole fields.

Simulation results for beam size enhancement for all sextupoles off