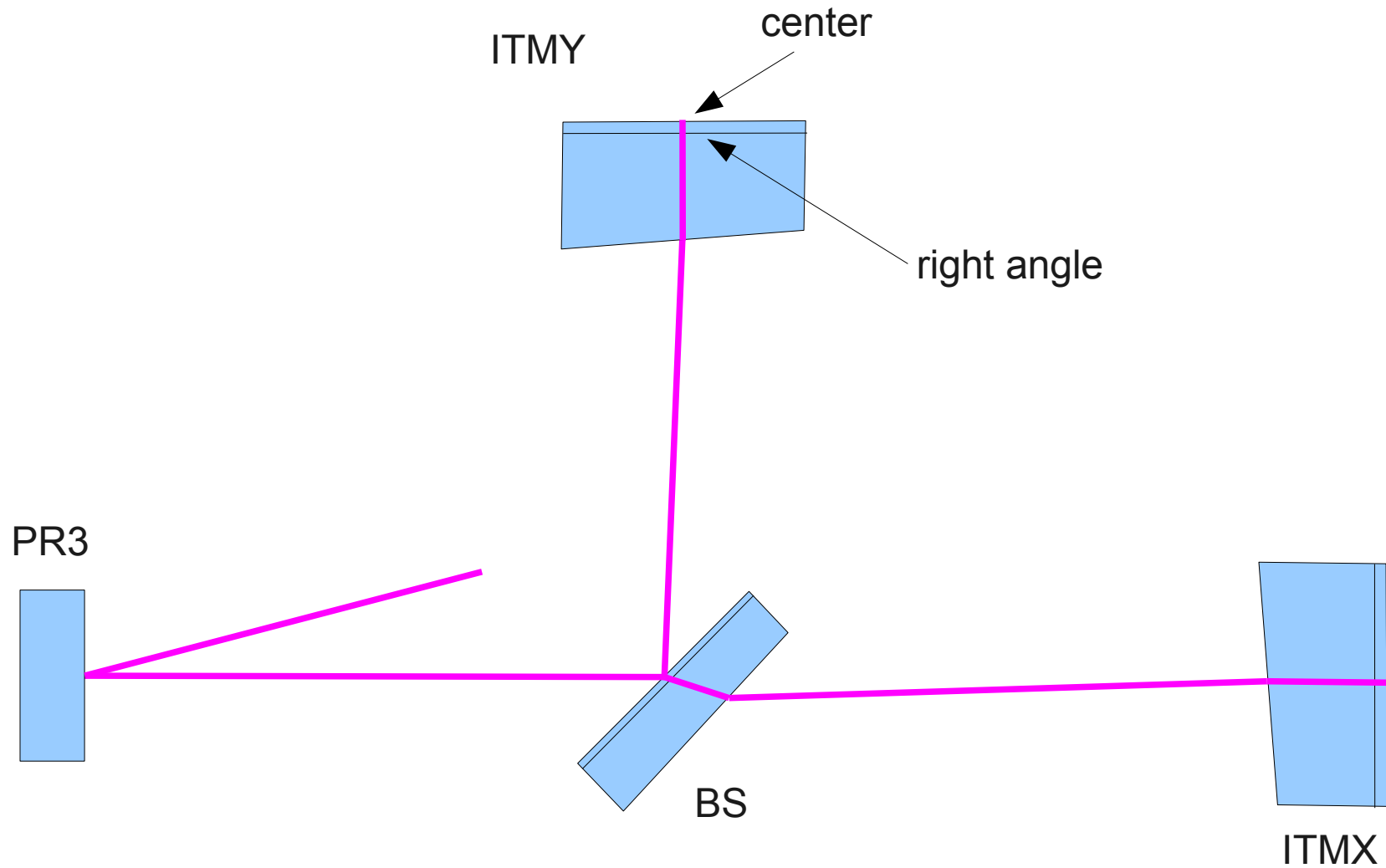


Wedge angle error tolerance for core optics

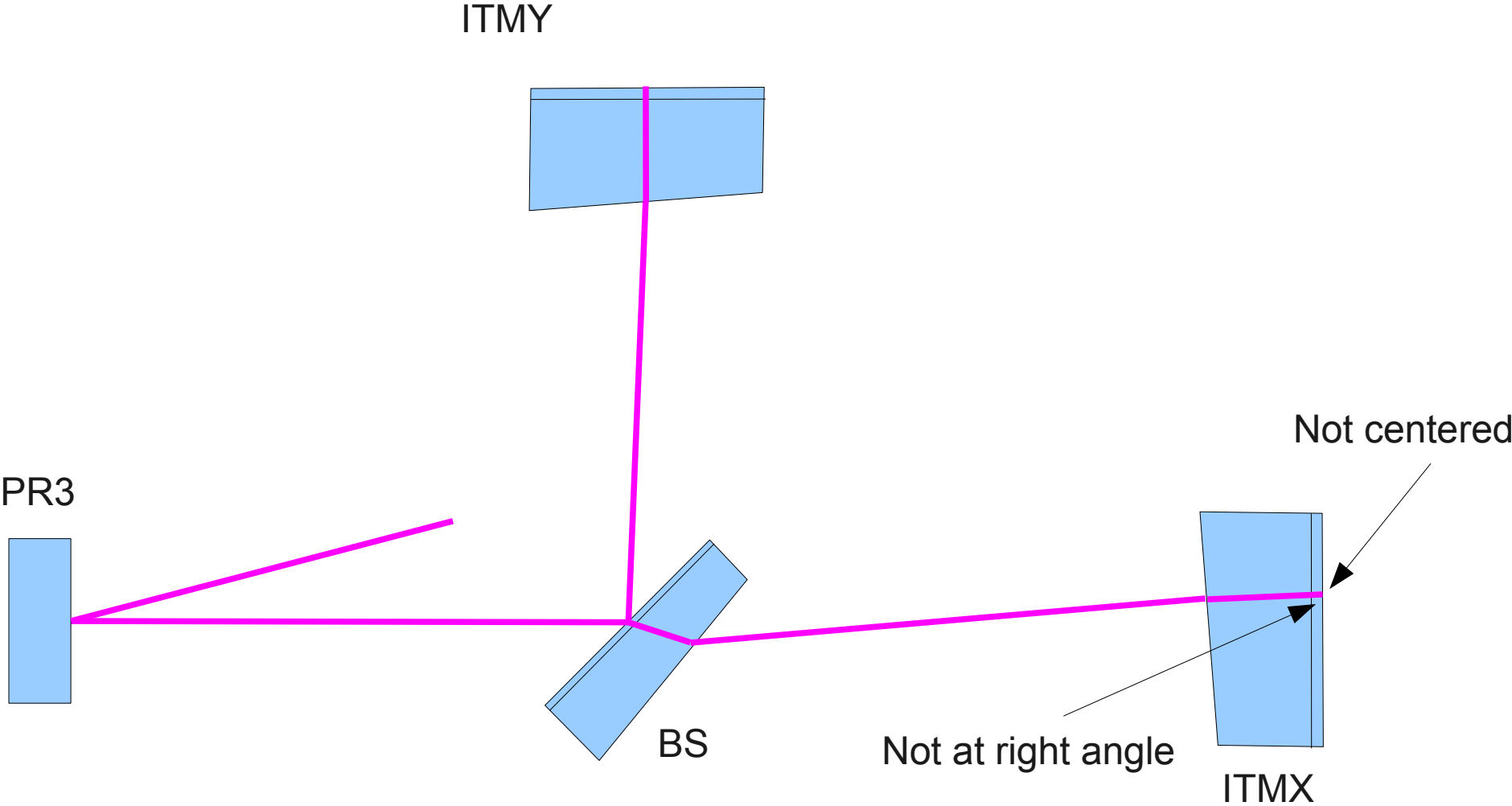
2011/6/23
Yoichi Aso

Optical Layout Requirements:

- Incident angle of the beam to the HR surfaces of the ITMs must be 90 deg.
- Beam spots must be at the center of the mirrors

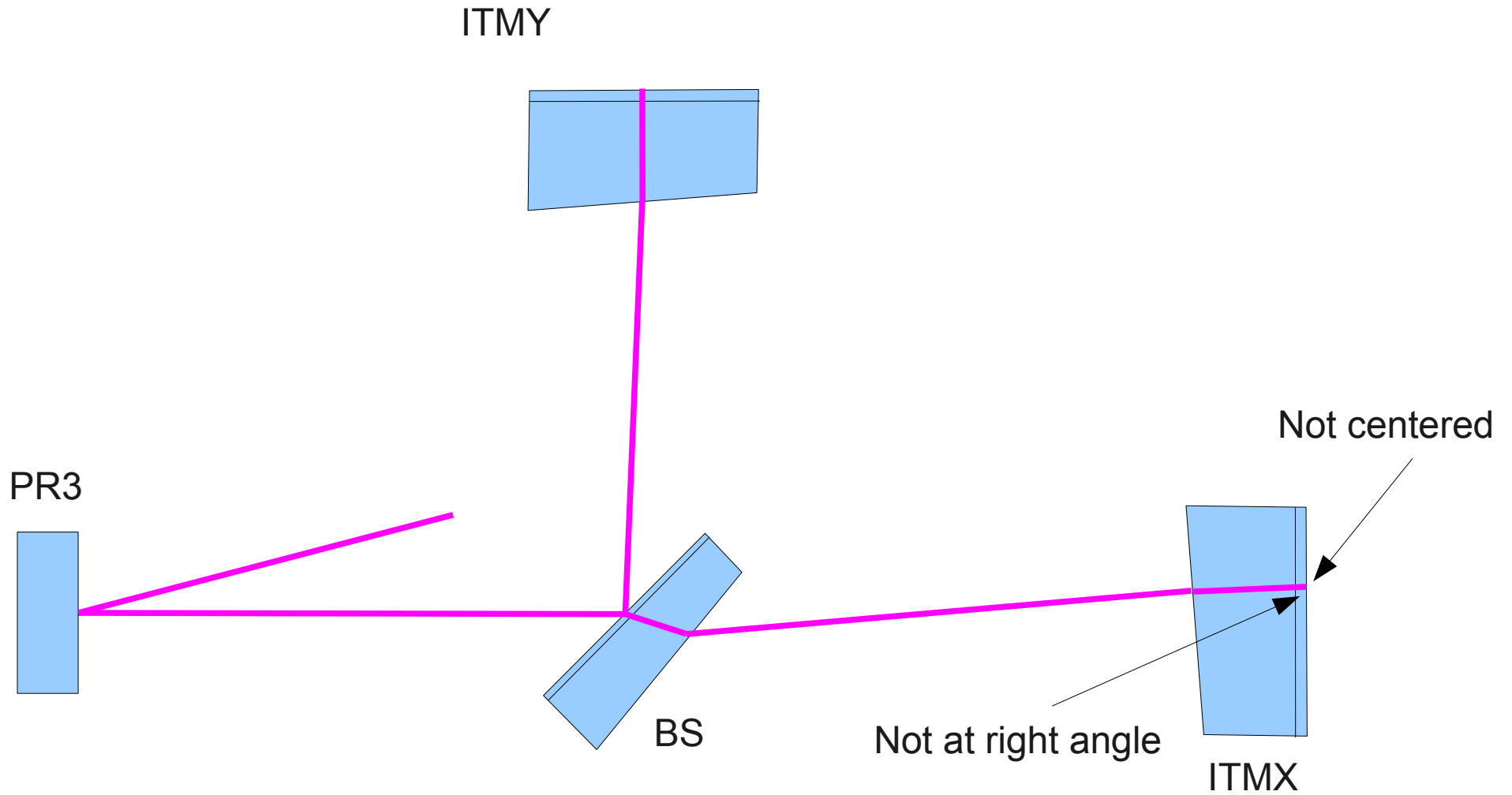


If the wedge angle of BS is different from the designed value



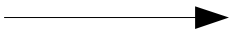
If the wedge angle of BS is different from the designed value

How to compensate for this error ?



If the wedge angle of BS is different from the designed value

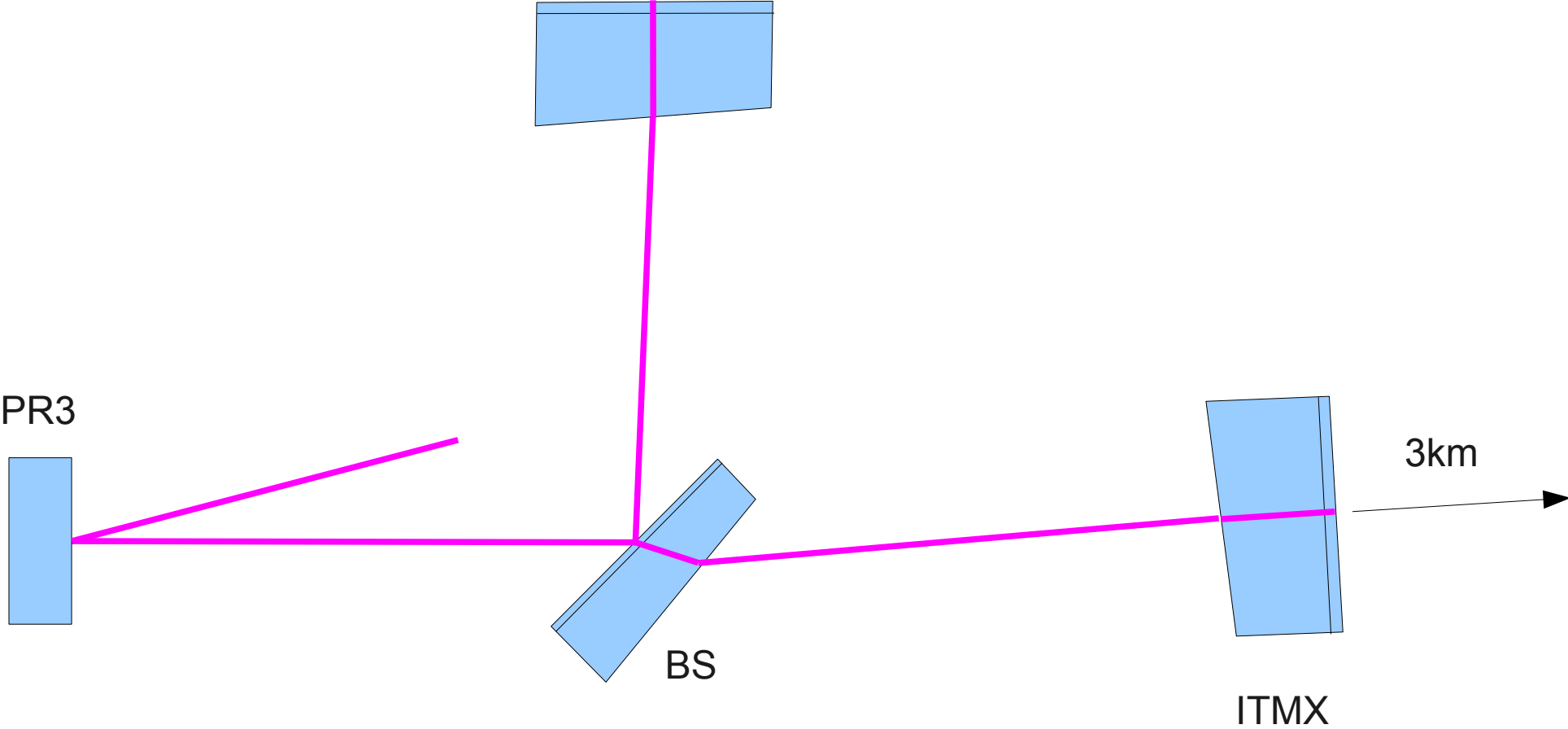
Rotate and move the ITMX ?



The beam spot on the ETMX moves a lot.

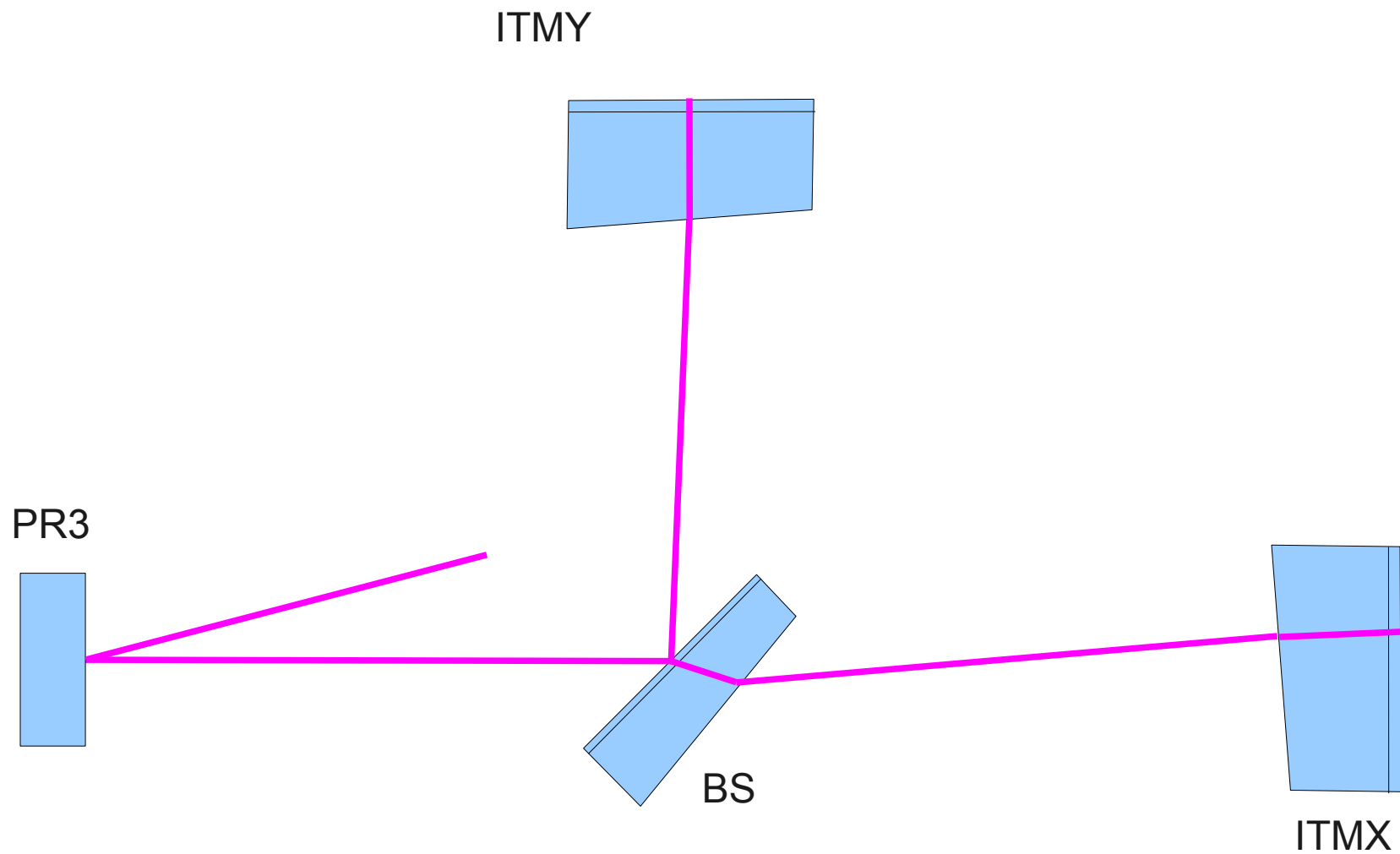
ITMY

Not an usable solution.



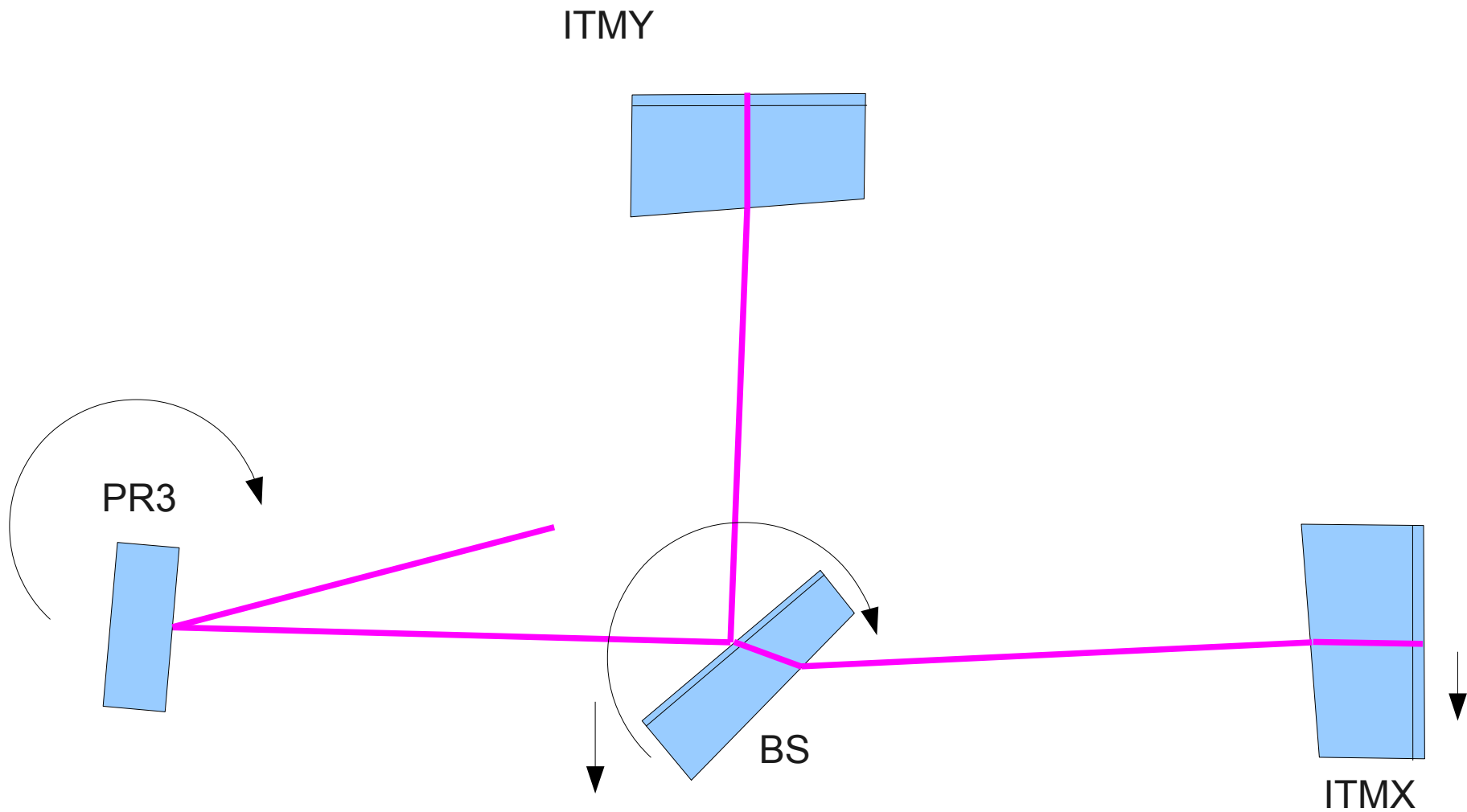
If the wedge angle of BS is different from the designed value

Anotherway ?



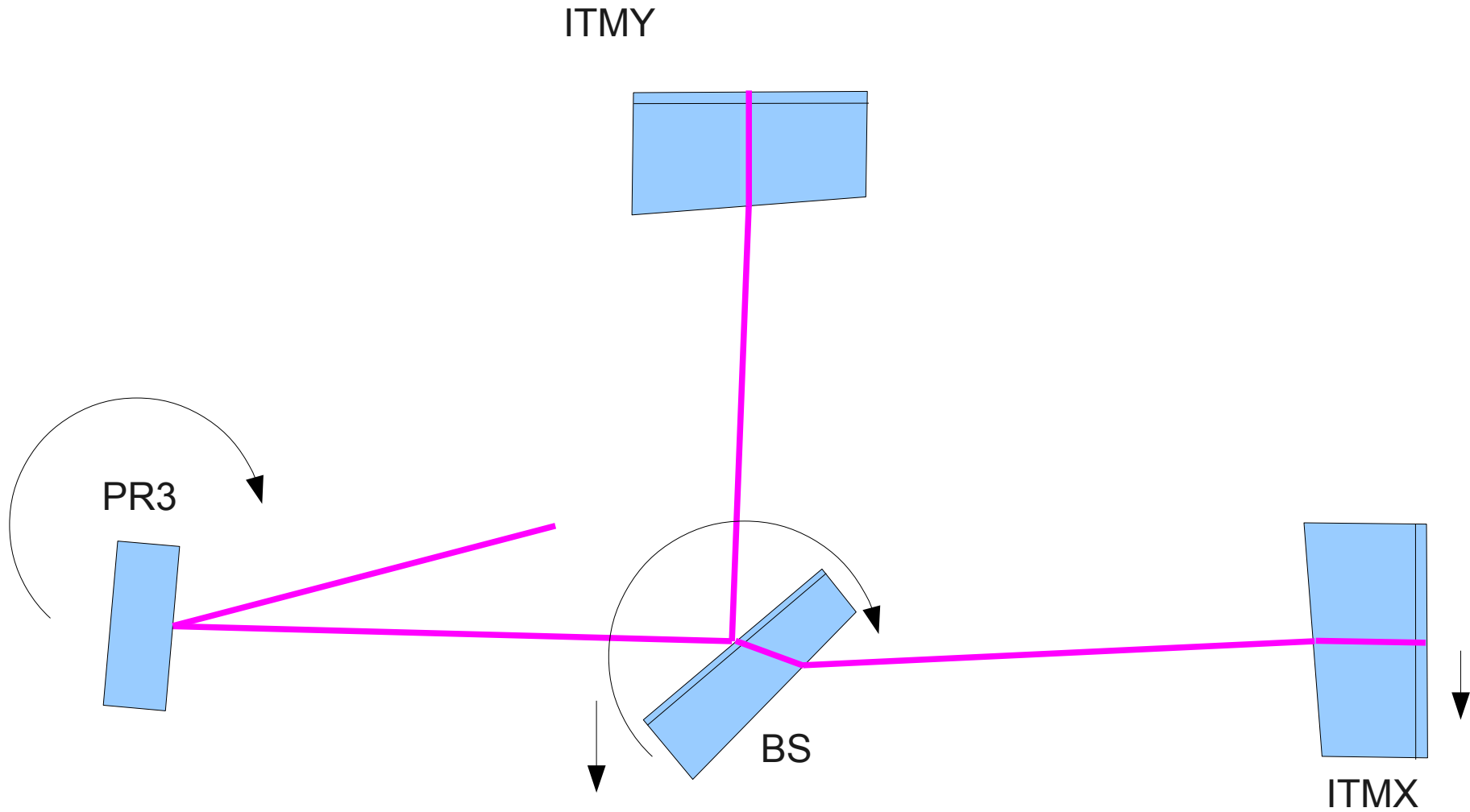
If the wedge angle of BS is different from the designed value

- Rotate PR3 and BS
- Move BS and ITMX to center the beam spots



This method can be used to compensate for the errors in ITMX and ITMY wedges

- Rotate PR3 and BS
- Move BS and ITMX to center the beam spots



Quantitative Evaluation

- In order to compensate for the wedge errors, we have to
 - rotate PR3 and BS
 - laterally move BS, ITMX and ITMY.
- Rotation angle is usually very small => no problem
- Lateral motion cannot be too large
 - It has to be within the range of SAS adjustment. (+/- 1cm ?)

ITM wedge angle: 0.2 deg
BS wedge angle: 0.38 deg

Assuming +/- 10% error

	BS offset	ITMX offset	ITMY offset
BS wedge error	11mm	8mm	7.8mm
ITMX wedge error	5.6mm	11mm	4mm
ITMY wedge error	0.1mm	0.2mm	6.2mm
Worst combination	16.6mm	18.9mm	17.6mm

- XXX offset is the amount mirror XXX has to be moved laterally.
- The rows labeled XXX wedge error are when the wedge error of 10% is only applied to the mirror XXX.
- “Worst combination” means that the 10% wedge error is introduced to all the mirrors with the worst combination of signs to maximize the necessary offsets.

Conclusion: 10% wedge angle error requires +/-2cm adjustable range to SAS