Pilot – PlanB

1- Pilot sensitivity limited by :

Les détecteurs (impossible d'en avoir d'autres)

Le champ de vue : 0.64 degré carré x 2 (2 polarisations)

Le bruit 1/f des détecteurs pour la polarisation

2- Detectors and field of view

Choix de la bande de fréquence : 600GHz au lieu de 1200

Eventuellement plusieures bandes (à discuter)

Utilisation de grande matrice de kid

Augmentation du champ de vue : 7 degré carré x 2

La sensibilité ne dépend que du champ de vue

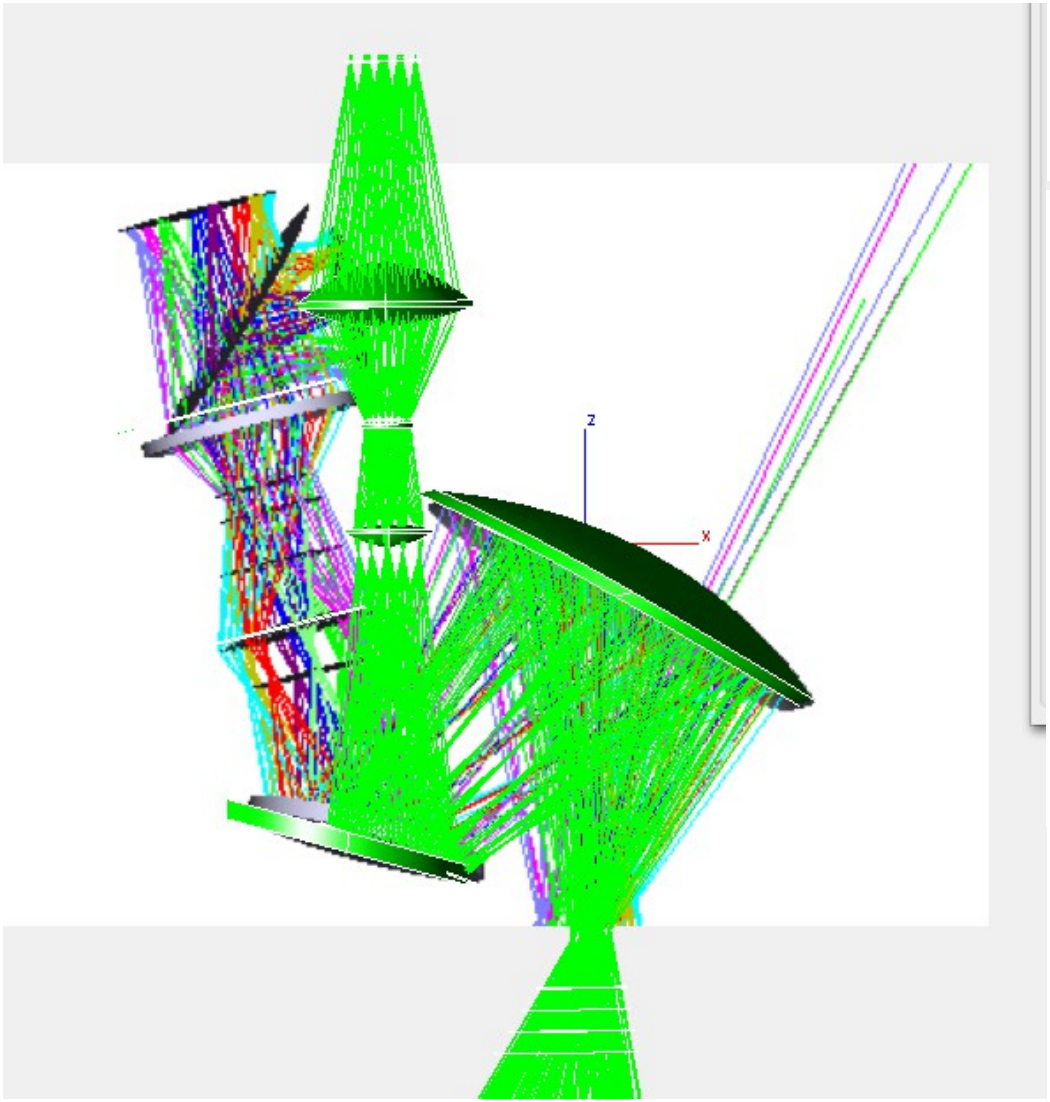
taille du pixel < tache de diffraction : résolution optimale

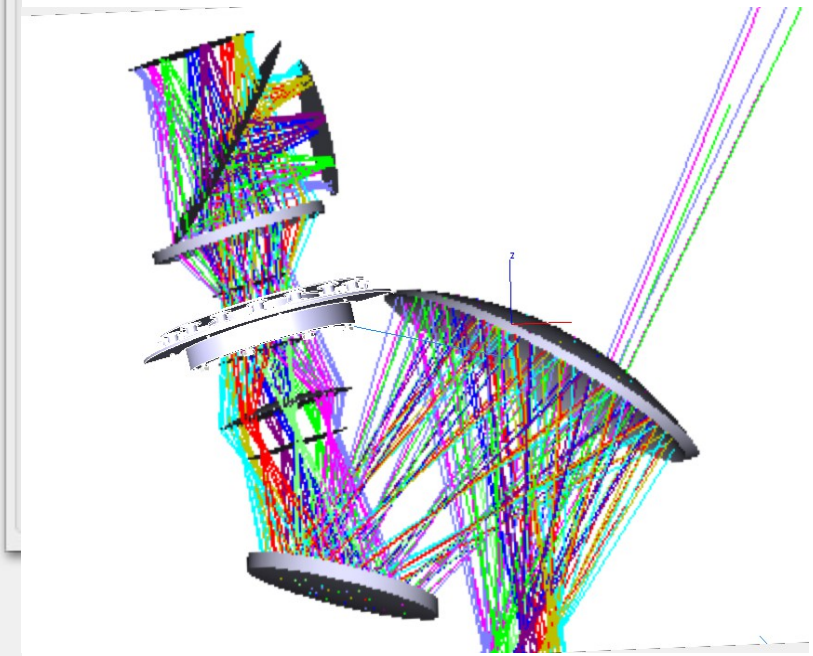
taille du pixel > tache de diffraction : résolution dégradée

3- Rotating ½ wave plate and 1/f noise

- modulation de la polarisation a 40 Hz
- réponse des kid à la millisec. (limitée par l'électronique)
- lame tournante en lévitation magnétique

Optics PlanB and Pilot





The PlanB proposition

1- Optics and field of view :

Same optical design than Pilot
Keep the primary mirror baffle and cryostat support
Maximum fiel of view 3 degré (10x Pilot)
Need flat or silicon lenses

2-Optics transmission :

Silicon lenses with anti-reflective coating
Very thin entrance window with a protection valve
(idem Archeops)

2-Kids array :

We can build arrays up to 2000 pixels
But limitation due to lack of electronic power :
only 500 or 1000 pixels for each polarisation
Lower angular resolution → 7 or 5 arcmin

3- ½ wave plate

Levitation on a supraconductor MgB2 ring Ø 7cm
Suppress 1/f noise on the polarisation measurement

4- Space dilution cryostat CCDR

Already developed in the lab for Anthena and CORE+
Available standard scroll pump 12V 15W

Key points to address

1- Half wave plate :

- first prototype Ø4cm succesfully tested at Néel institut
- Nez prototype Ø7cm under fabrication
- Test rotation speed
- Test angular position measurement accuracy

2- Silicon lenses or flat lenses :

- Silicon lenses OK but anti-reflective layer difficult
  - cover with a low indice layer
  - etching small halls in silicon (already used for kids arrays)
- Flat lenses to be tested (B. Maffei)

3- Low power electronics :

- Adaptationto the NIKA2 electronics
- Collaboration LPSC - IRAP

Calendar

1- design of the optics and cryostat :

Start now : first drawing in may

2-Construction of cryostat :

starting in may, can be ready end of year

3-Detectors fabrication :

Already some 60 pixel array

Soon we can have 500 or 1000 pixels array

4- Electronics

We have to start now the design as it will take time.

But it can be ready for beginning 2017

5- optics, detectors and electronics integration :

starting in jaunary 2017 :

no ready before the Pilot2 flight in april 2017

5- Testing the instrument

Measuring performances and preparation for flight

Take at least 6 month

6- Ready for a flight in april 2018 (flight 3 of Pilot)