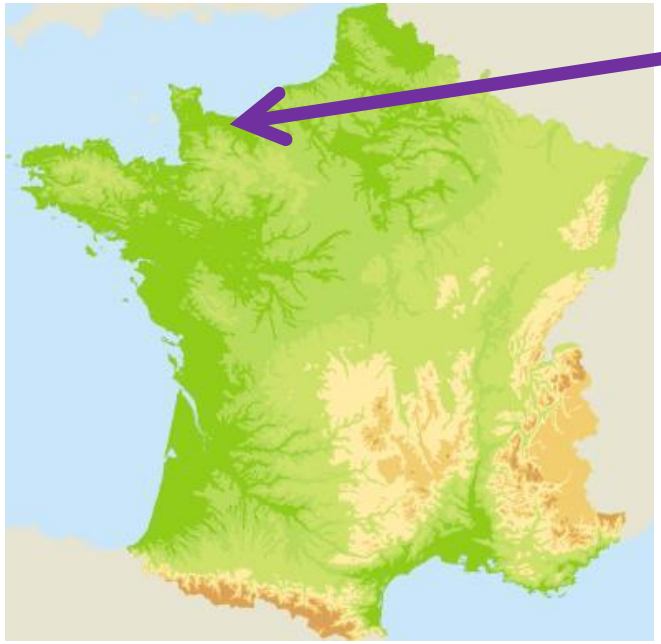
High level applications for Spiral 2

Guillaume Normand

GANIL – Spiral 2

Caen - France



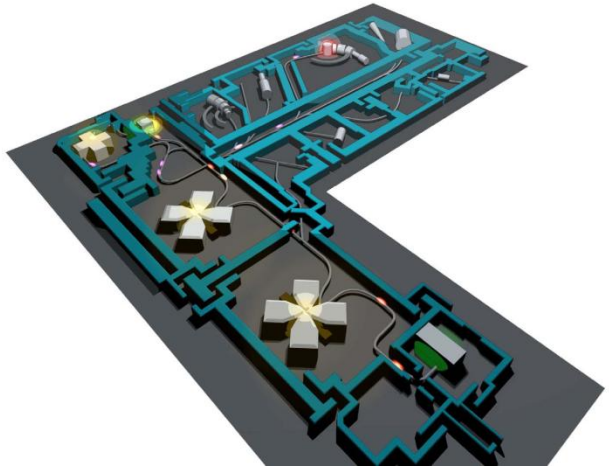
XAL Workshop May 2010 - SNS

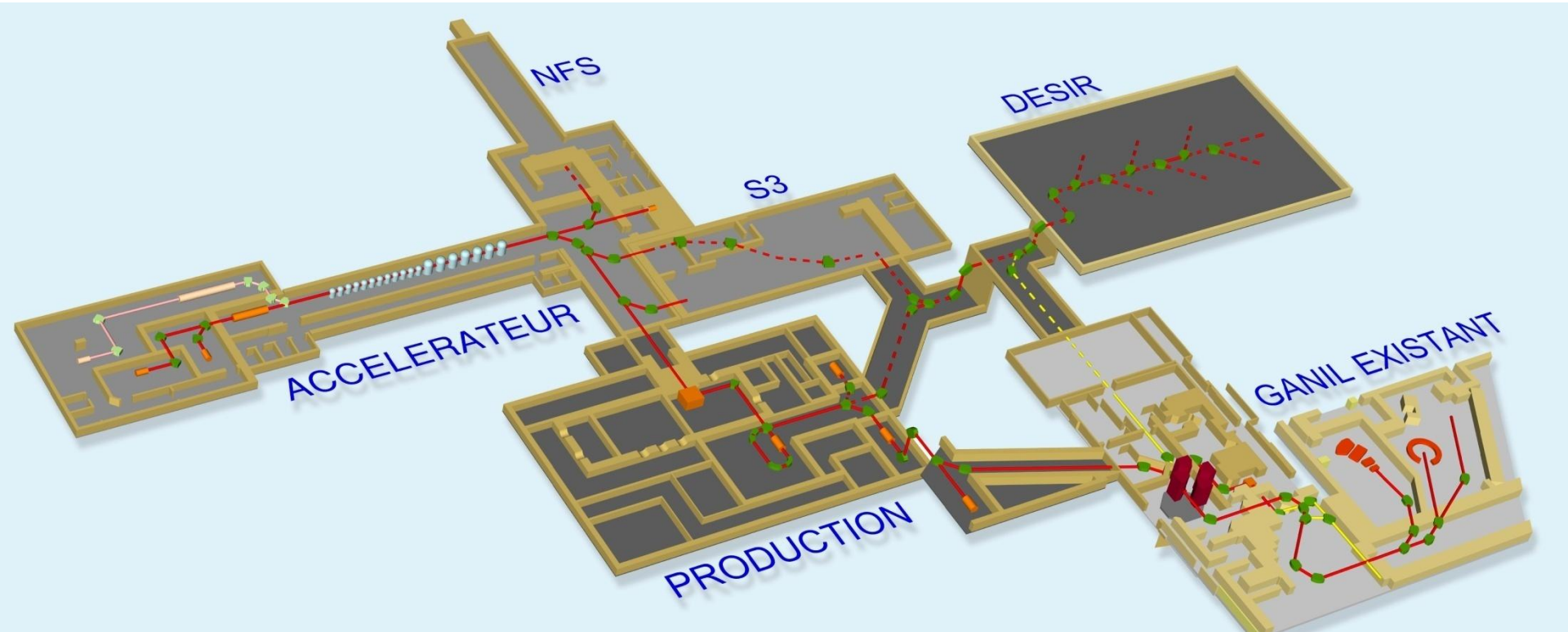
Summary

- Project general views
- Beams available
- Parameters creation
- Applications examples : alignment and minimization
- Collaboration

See Pascal Gillette talk for XAL-Spiral2 adaptation

GANIL-Spiral 2





Beams/targets
(For the driver only)

	Q/A	Intensity range mA	Energy range MeV/u	Cw max power kW
Protons	1	0 - 5	2 - 33	165
Deutons	1/2	0 - 5	2 - 20	200
Ions	1/3	0 - 1	2 - 14.5	43.5
Ions (future)	1/6	0 - 1	2 - 8.5	51

Path : from ECR light ion source or ECR 1/3 ion source to :
- NFS : neutron for science
- S3 : super spectrometer
- Main beam dump (Linac tuning, study…)
- Production of radioactive beams : UCx with/without convertor, other targets

Beams species * Beam structure and size on the target * Path source-target *Beam Power

→ Many combinations !

… tuning not straightforward

Tools outside XAL

Creation of parameters set:

- GenLinWin (for the LINAC cavities parameters)
- Toutatis (for the RFQ)
- Tracewin (3D maps. Envelope and multi particles simulations)

Virtual accelerator using these codes:

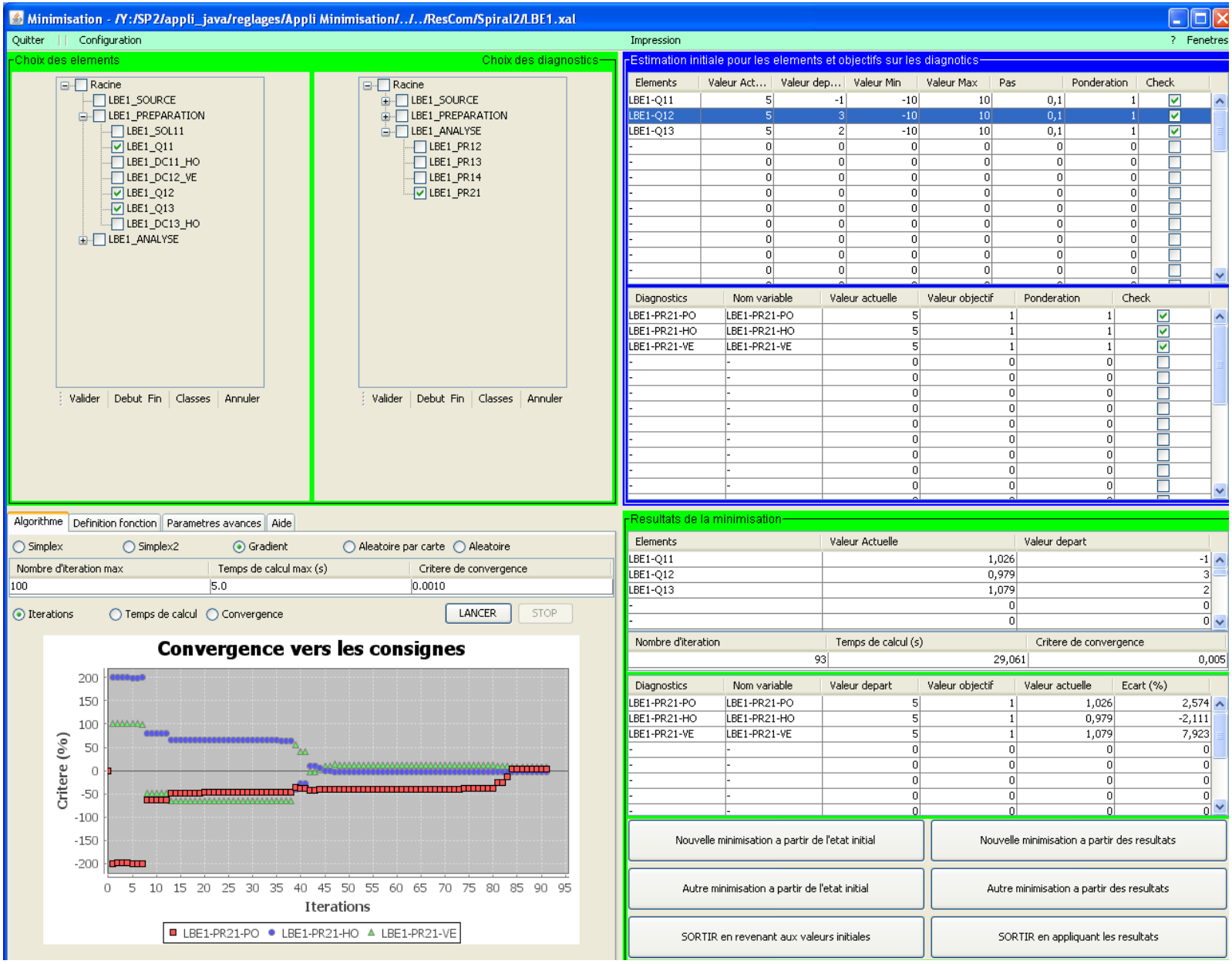
- Supervision : allows a comparison between code and reality, using real diagnostics : improvement of the codes.
- Flight simulation : creates with the code new parameters during the tuning using real diagnostics, and apply them if the solution seems to be good.

Tools inside XAL

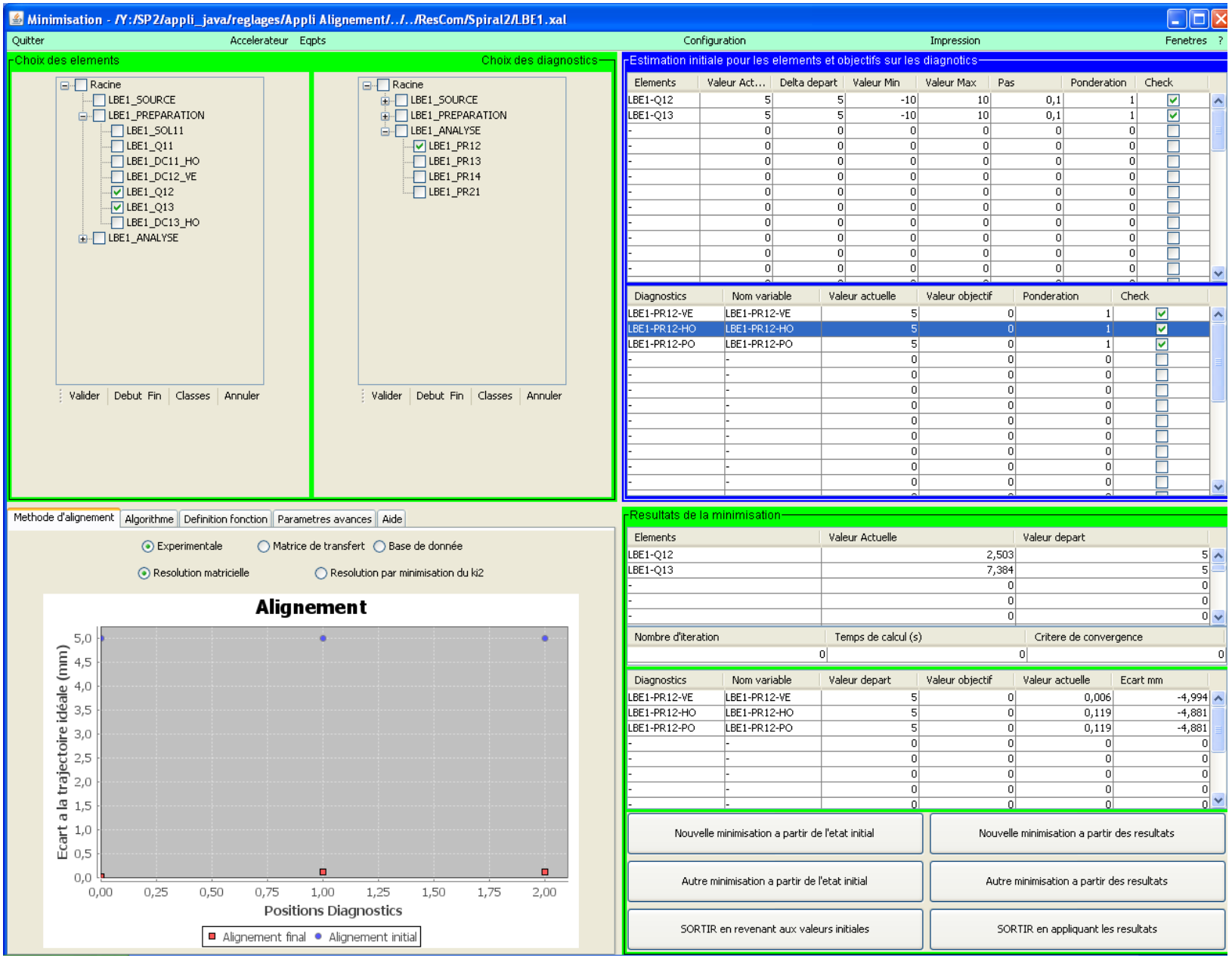
High level applications:

- Matching, optimization, alignment, rebuncher, cavity tuning, beam loss control, slits, display of profile, beam current…
- In the future : partial automatic tuning…

Minimization



Alignment


Minimisation - /Y:/SP2/appli_java/reglages/Appli Alignement/../../ResCom/Spiral2/LBE1.xal
Quitter
Accelerateur
Eqpts
Configuration
Impression
Fenetres
Choix des elements
Racine
LBE1_SOURCE
LBE1_PREPARATION
LBE1_SOL11
LBE1_Q11
LBE1_DC11_HO
LBE1_DC12_VE
LBE1_Q12
LBE1_Q13
LBE1_DC13_HO
LBE1_ANALYSE
Valider
Debut Fin
Classes
Annuler
Choix des diagnostics
LBE1_PR12
LBE1_PR13
LBE1_PR14
LBE1_PR21
Estimation initiale pour les elements et objectifs sur les diagnotics
Elements
Valeur Act...
Delta depart
Valeur Min
Valeur Max
Pas
Ponderation
Check
LBE1-Q12
LBE1-Q13
Diagnostics
Nom variable
Valeur actuelle
Valeur objectif
Ponderation
LBE1-PR12-VE
LBE1-PR12-HO
LBE1-PR12-PO
Methode d'alignement
Algorithme
Definition fonction
Parametres avances
Aide
Experimentale
Matrice de transfert
Base de donnée
Resolution matricielle
Resolution par minimisation du ki2
Alignement
Ecart a la trajectoire idéale (mm)
Positions Diagnostics
Alignement final
Alignement initial
Resultats de la minimisation
Valeur Actuelle
Valeur depart
2,503
7,384
Nombre d'iteration
Temps de calcul (s)
Critere de convergence
Ecart mm
-4,994
-4,881
Nouvelle minimisation a partir de l'etat initial
Nouvelle minimisation a partir des resultats
Autre minimisation a partir de l'etat initial
Autre minimisation a partir des resultats
SORTIR en revenant aux valeurs initiales
SORTIR en appliquant les resultats

Collaboration

Constraints

- Operator teams are not physicists : simplicity.
- Schedule and manpower : probably not able to really collaborate before the end of the commissioning.

Present status

- XAL has started to be adapted to the Spiral 2 project
- Application using the solver will be tested in the next months

What could help us now

- Matching : perhaps the J-Park or SNS applications could be used for this purpose ?
- For the tuning of cavities, the SNS applications could probably be very helpful.
- To have a better understanding of how to use the XAL model.

After tests with the real accelerator, if our applications can help other groups, it will be a pleasure to give it to them and more generally to collaborate !

Many thanks to the XAL project team to share these powerful tools !

Thank you for your attention