

ISAC strategy workshop November 2019

Upgrade LE feed line to the ISAC-I RFQ

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Engineering physics group leader

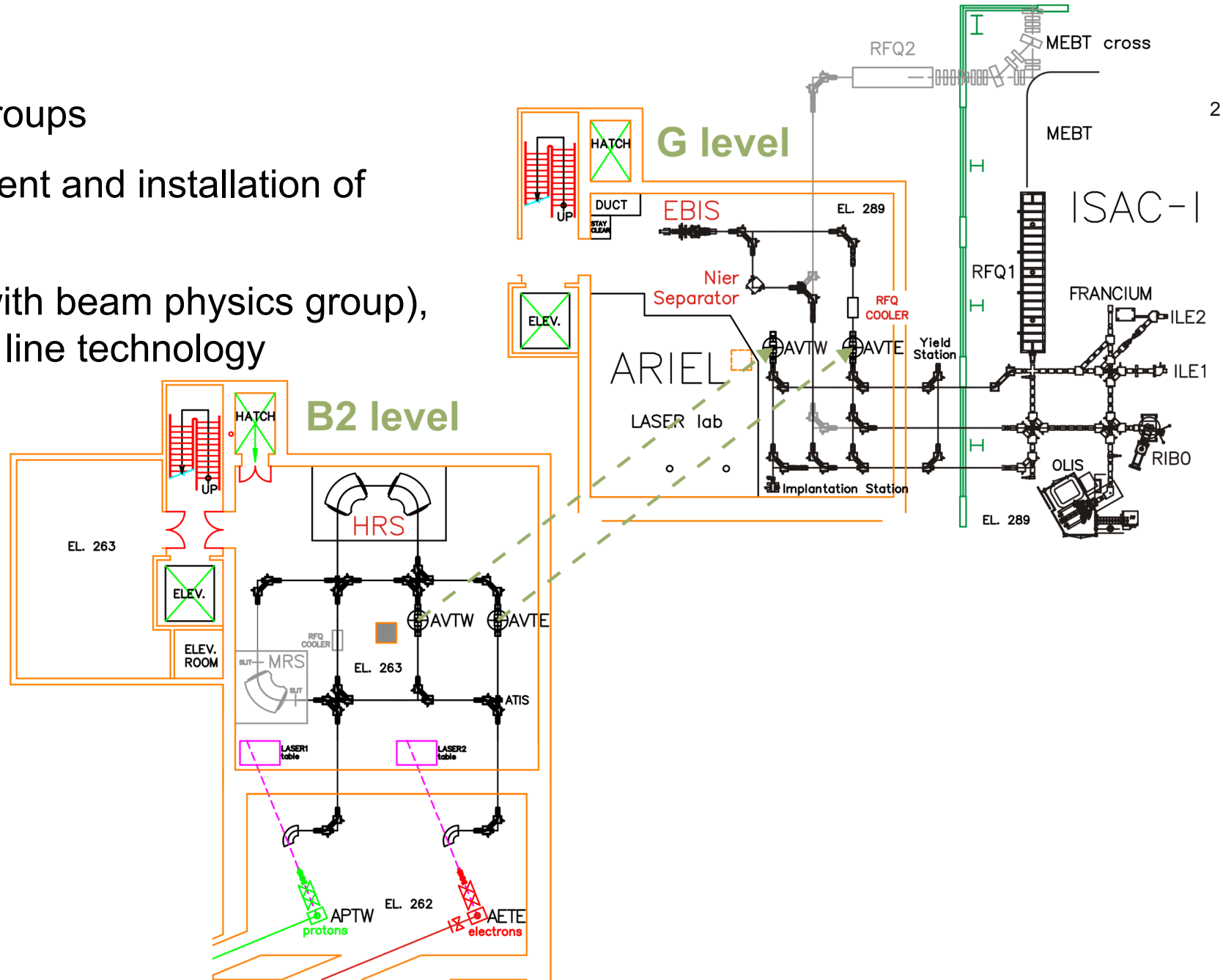
08/11/2019



Background information

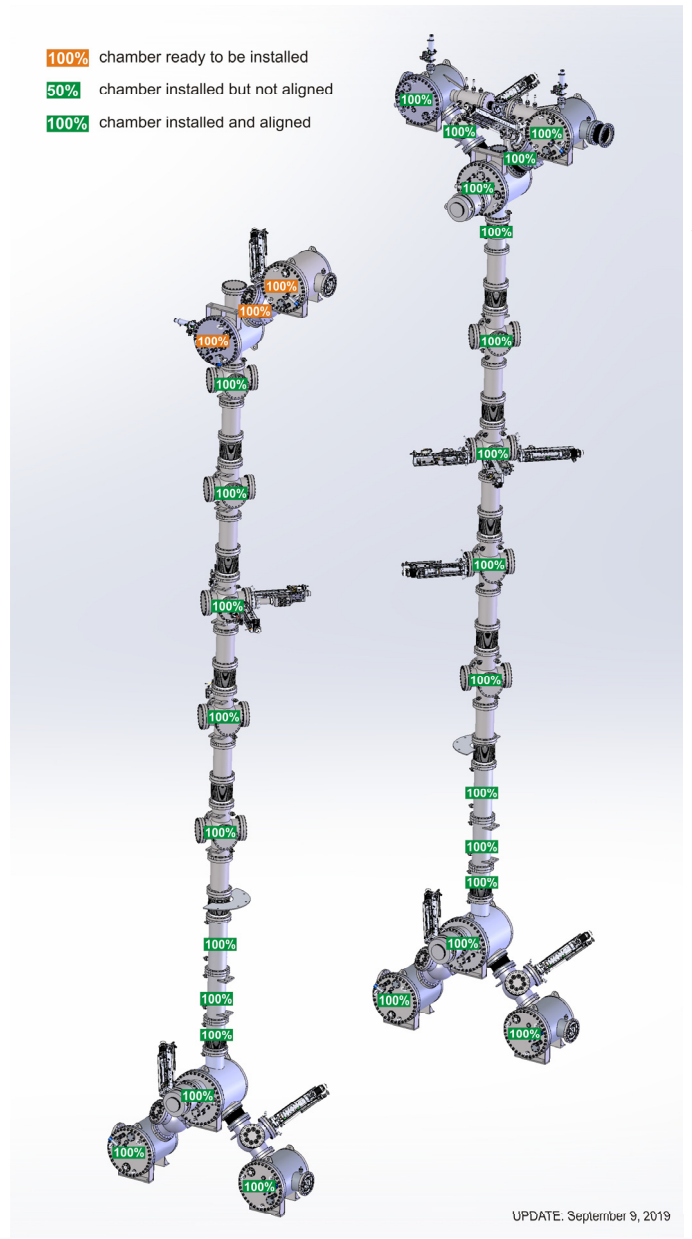
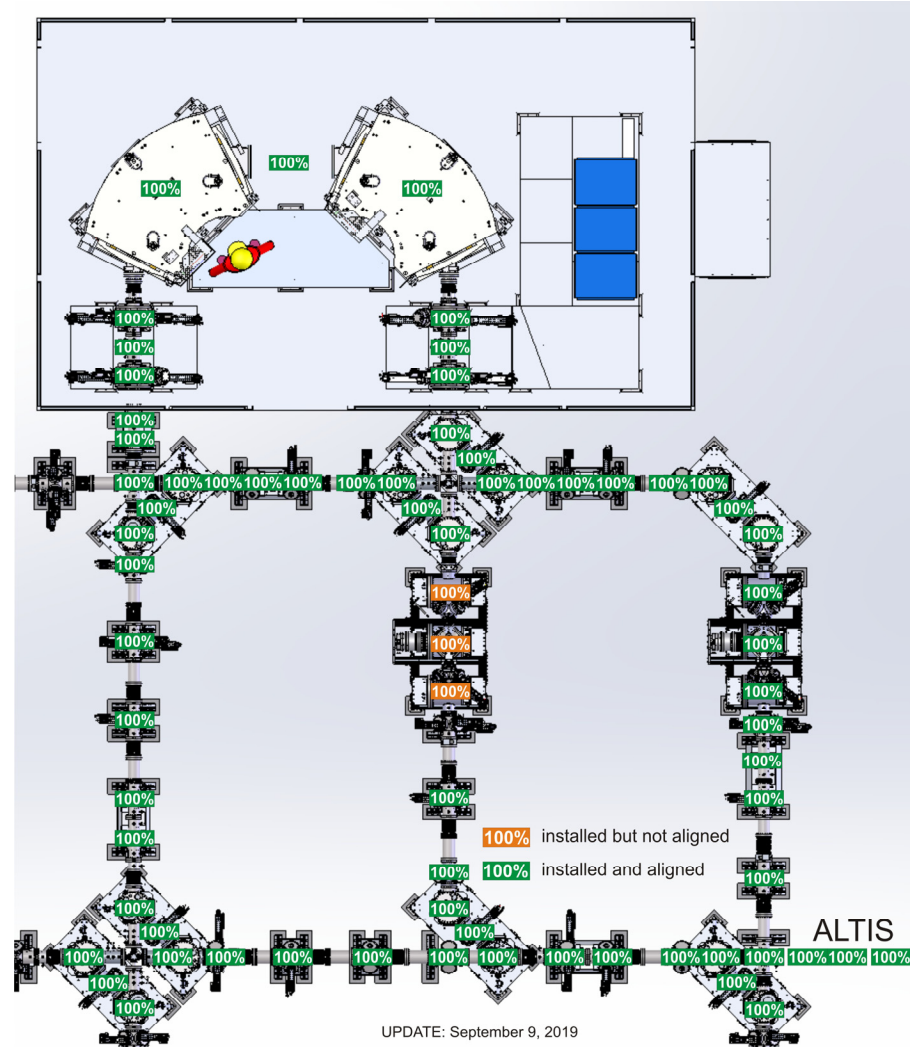
Engineering physics group:

- Includes ISIS and beamlines groups
- Design, engineering, procurement and installation of beam lines
- Skills: optics (in collaboration with beam physics group), mechanical engineering, beam line technology
- ARIEL-II RIB transport: 200+ m of electrostatic beam lines



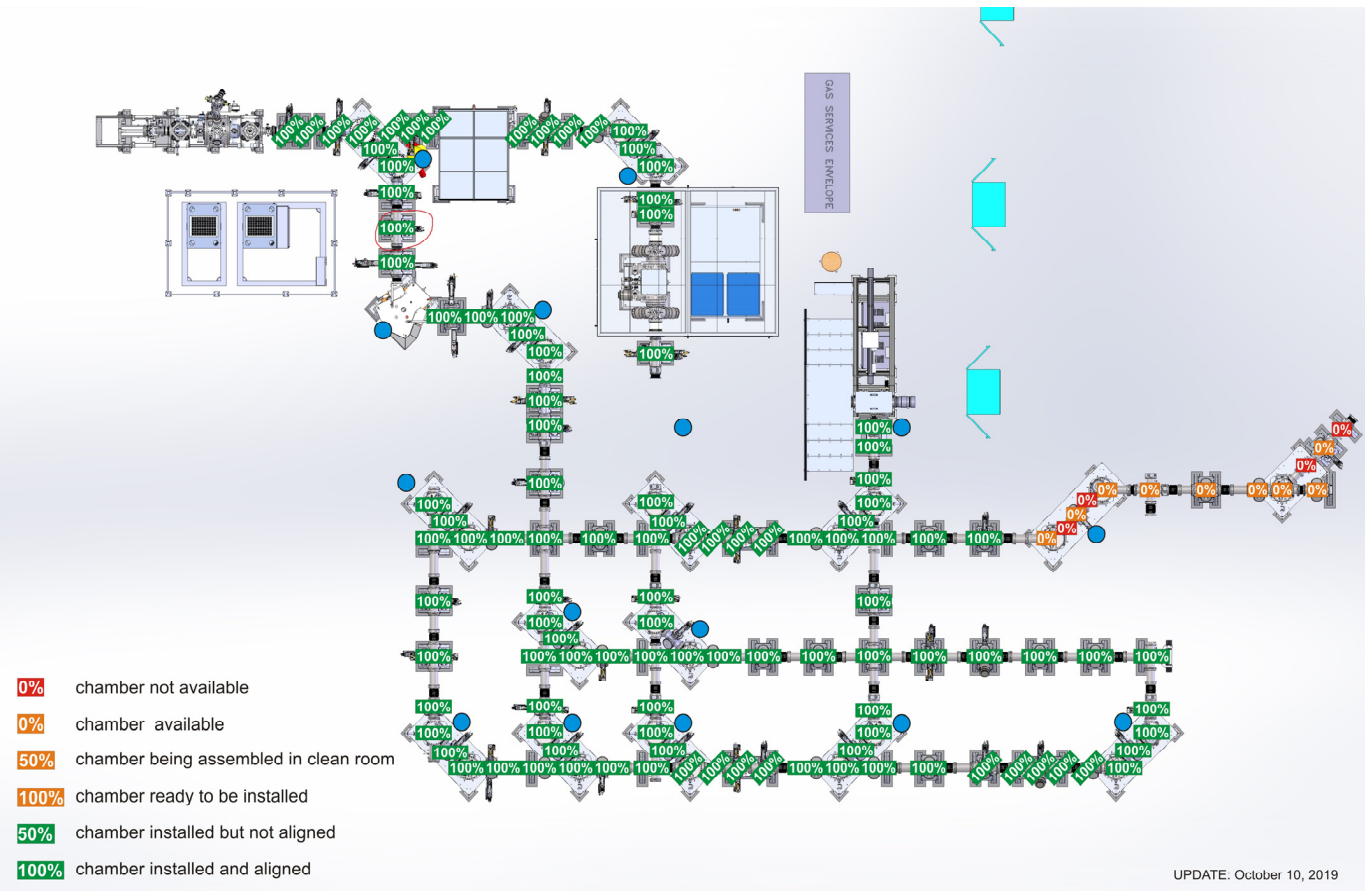
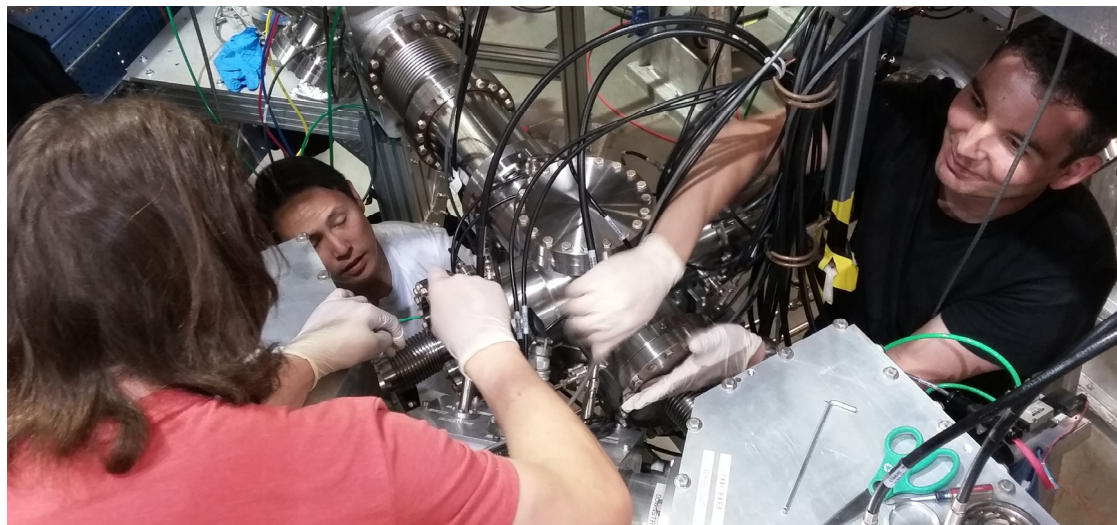
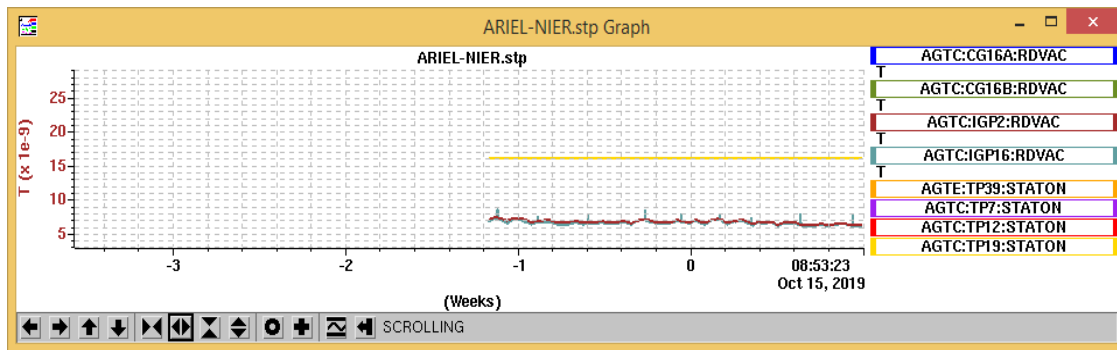
ARIEL-II installation at B2 and verticals

- High Resolution Separator (HRS)
- UHV (ARIEL specification: less than $3 \cdot 10^{-8}$ Torr)
- Stable beam ion source (ALTIS)



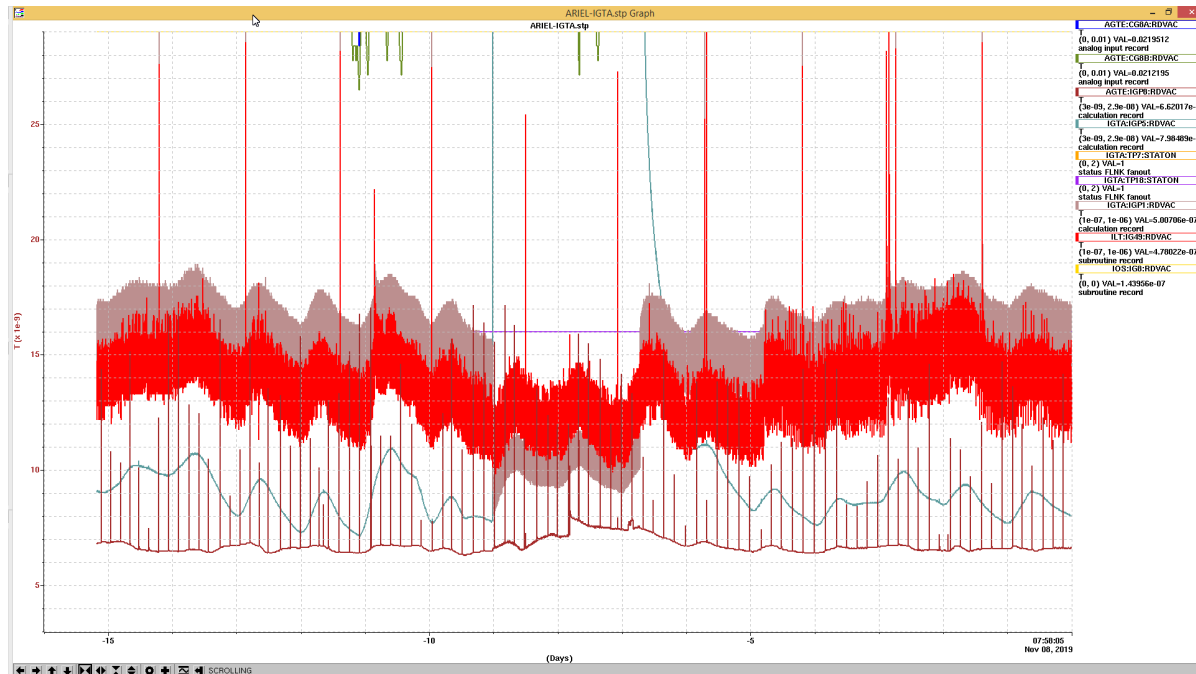
Installation status at G level

- “CANREB” beam lines
- High charge state section in the mid 10^{-9} Torr
- Connection to ISAC low energy: ILE-1, ILE-2, ILT (ISAC-I RFQ injection line)



Why ILT upgrade?

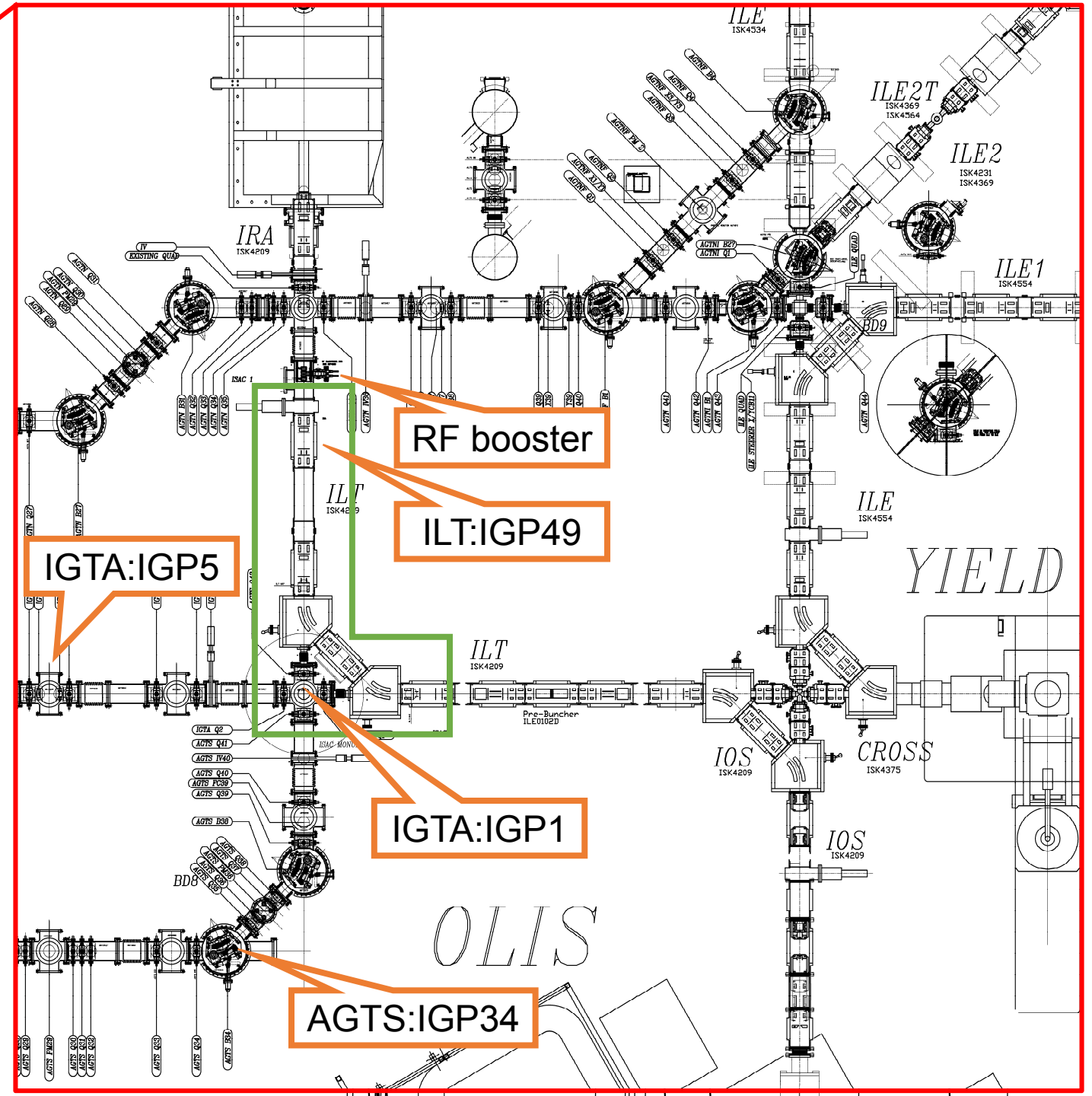
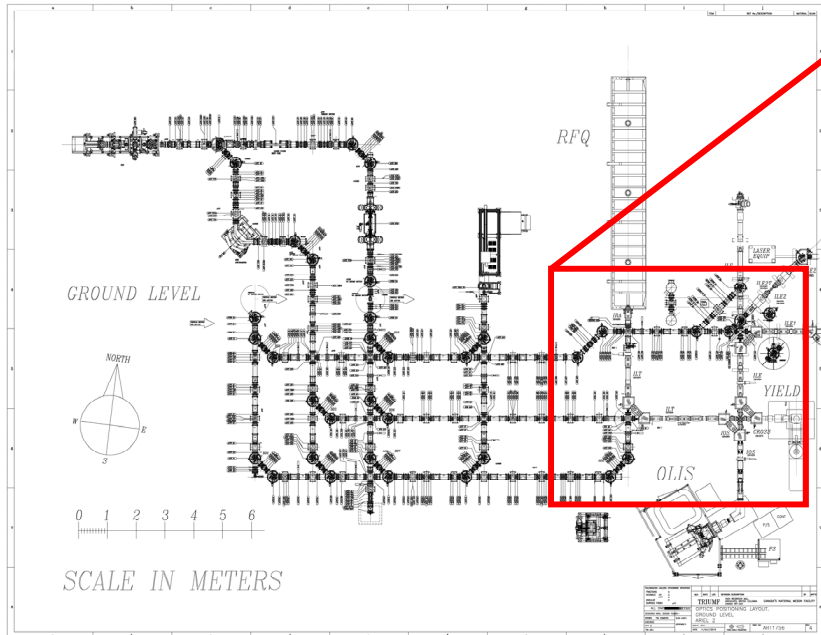
- Need for a new matching section for the RF booster to improve injection efficiency into the ISAC-I RFQ (see Olivier presentation)
- Reduce beam losses due to charge exchange in poor vacuum for highly charged beams (from ISAC or ARIEL)
 - 10+ beam in $1 \cdot 10^{-8}$ Torr loses 0.1%/m
 - 10+ beam in $5 \cdot 10^{-7}$ Torr loses 5 %/m
- A charge exchange issue is present also in ISAC-I MEBT



AGTE:CG8A:RDVAC	T (0, 0.01) VAL=0.0219512 analog input record
AGTE:CG8B:RDVAC	T (0, 0.01) VAL=0.0212195 analog input record
AGTE:IGP8:RDVAC	T (3e-09, 2.9e-08) VAL=6.62017e-09 calculation record
IGTA:IGP5:RDVAC	T (3e-09, 2.9e-08) VAL=7.98489e-09 calculation record
IGTA:TP7:STATON	(0, 2) VAL=1 status FLNK fanout
IGTA:TP18:STATON	(0, 2) VAL=1 status FLNK fanout
IGTA:IGP1:RDVAC	T (1e-07, 1e-06) VAL=5.00706e-07 calculation record
ILT:IG49:RDVAC	T (1e-07, 1e-06) VAL=4.78022e-07 subroutine record
IOS:IG8:RDVAC	T (0, 0) VAL=1.43956e-07 subroutine record

AGTE:CG5A:RDVAC	T (0, 0.02) VAL=0.00804878 analog input record
AGTE:CG5B:RDVAC	T (0, 0.02) VAL=0.0239024 analog input record
AGTE:IGP5:RDVAC	T (3e-09, 2.9e-08) VAL=1.06968e-08 calculation record
AGTS:IGP34:RDVAC	T (3e-09, 2.9e-08) VAL=6.52164e-09 calculation record
AGTS:TP12:STATON	(0, 2) VAL=1 status FLNK fanout
AGTS:TP20:STATON	(0, 2) VAL=1 status FLNK fanout
AGTS:TP29:STATON	(0, 2) VAL=1 status FLNK fanout
AGTS:TP38:STATON	(0, 2) VAL=1 status FLNK fanout

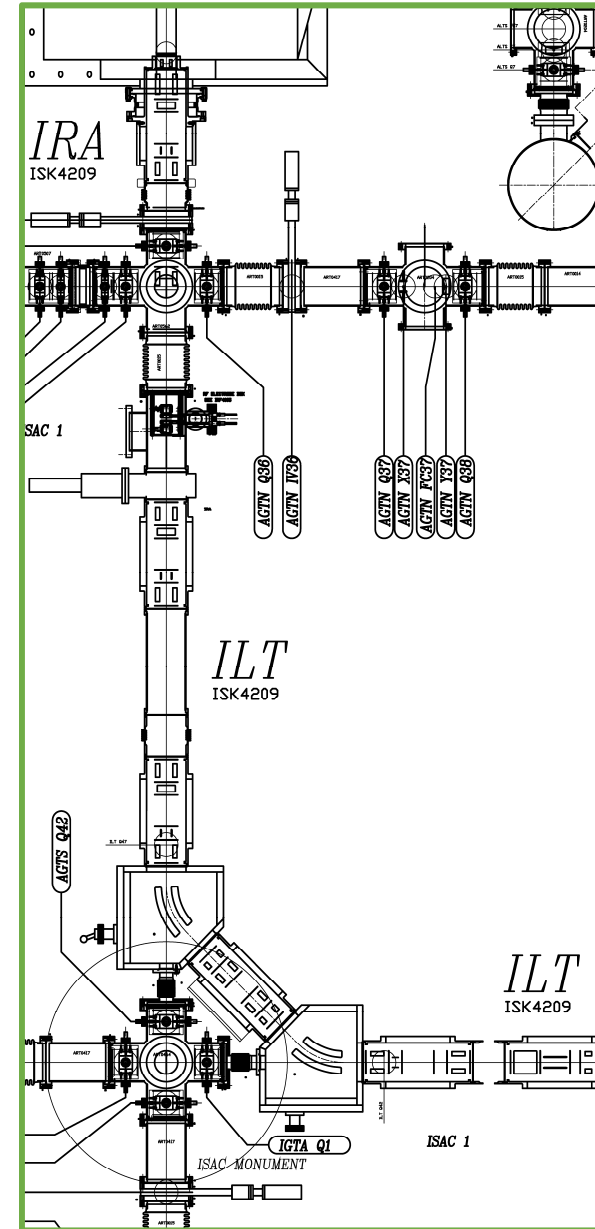
ILT upgrade



- Proposed upgrade (green box)
 - Exchange vacuum boxes to accommodate new optics (matching section)
 - UHV compatible (low 10^{-8} Torr) to reduce charge exchange
 - Possibility of isolating ARIEL from ISAC to maintain UHV

ILT upgrade estimates

- Capital:
 - Vacuum boxes with optics: 60 k\$
 - Vacuum equipment: 30 k\$
 - Diagnostic: 5 k\$
 - Power supplies: 5 k\$
- Manpower:
 - Physicist: 2 FTE month
 - Designer: 1 FTE month
 - Engineer: 0.5 FTE month
 - Technicians: 4 FTE month



Thank you
Merci

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