



HIE-ISOLDE

CERN-ISOLDE towards the future!

Mats Lindroos

Acknowledgements to Pierre Delahaye, Fredrik Wenander, Didier Voulot, Bruce Marsh, Valentin Fedosseev, Olli Launi, Matteo Passini, Peter Butler, Adrian Fabich, Matteo Pasini, Sergio Calatroni, Vittorio Parma, Michele Modena and all my colleagues at ISOLDE



HIE-ISOLDE: Next step with three objectives

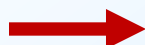


- ✓ REX energy upgrade and increase of current capacity
 - Energy upgrade in 3 stages: 5.5 MeV and 10 MeV/u and lower energy capacity
 - REX trap and charge breeder upgrade
- ✓ ISOLDE proton driver beam intensity upgrade - strongly linked to PS Booster improvements including linac4
 - Faster cycling of the booster
 - New target stations for ISOLDE
 - New targets
 - New target handling system
- ✓ ISOLDE radioactive ion beam quality - more than half already financed through the ISOLDE collaboration
 - Smaller longitudinal and transverse emittance
 - Higher charge state for selected users
 - Better mass resolution
 - Target and ion source development e.g. RILIS

Upgrade of RILIS lasers at ISOLDE

Diode Pumped Solid State Nd:YAG Lasers as replacement of Copper Vapor Lasers:

CVL
15 ns @ 11 kHz



SSL
8 ns @ 10 kHz

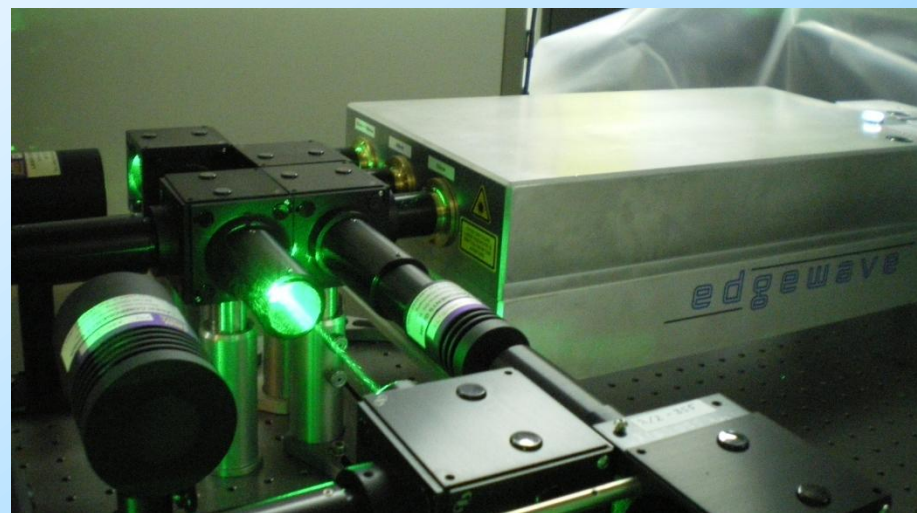
Green Beams
92 W @ 532 nm

UV Beam
18 W @ 355 nm

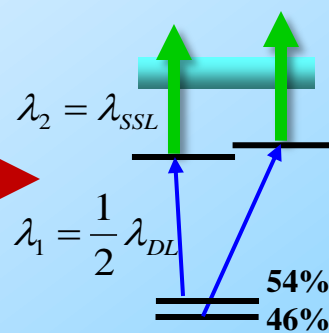
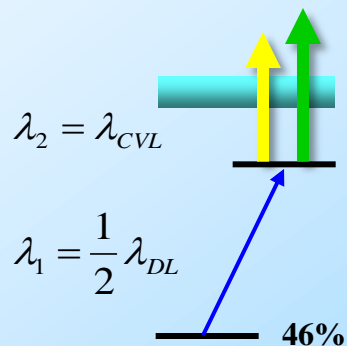
IR Beam
45 W @ 1064 nm

Green Beams
45 W @ 511 nm

Yellow Beams
35 W @ 578 nm



Ga ion beam has been produced with the SSL



Improvement of ionization efficiency by SSL :

- Two dye lasers were applied at 1st step of excitation - x 2.2
- More power could be delivered to HRS target at the 2nd step of excitation

And CVLs are still available for ru



Total all parts of project



		Swiss Francs	
		Still required	
		Staff	Material
		FTE	kCHF
1a	LINAC prototyping and cryo design	5.5	425
1b	LINAC 3.0 - 5.5 MeV/u	25.5	6,888
1c	Linac 5.5 - 10 MeV/u	19.0	3,350
1d	LINAC lower energies	9.5	1,325
1e	Beam lines for experimental area	1.0	500
2	REX trap and charge breeder	12.1	2,238
3	TS consolidation		2,000
	REX UPGRADE	72.6	16,726
4	Targets & Front-ends	25.8	8,100
5	PSB 900 ms	9.0	2,000
	PROTON DRIVER BEAM	34.8	10,100
6	RFQ cooler	0.0	500
7	RILIS upgrade	0.0	2,400
8	High-charge state beams	1.1	800
9	New HRS	0.8	1,100
	BEAM QUALITY	1.9	4,800
10	Radiation protection consolidation	1.0	750
11	Vacuum consolidation	8.5	2,408
	CONSOLIDATION	9.5	3,158
	TOTAL	118.8	34,784
	Total Material	34,784	
	Total Personnel	10,000	



HIE-ISOLDE: Where are we?



- External grant from Belgium
 - 1 engineer post - Matteo
 - 1.3 MCHF for R&D on SC linac
- Second grant from Belgium approved for both physics programme and SC linac construction for HIE-ISOLDE
 - 2.7 MCHF (540 kCHF per year for 5 years) for the SC linac construction
- Proposal in the UK to finance SC linac development and construction
- Pre-study in Finland for new remote handling system
- RFQ cooler WP and RILIS WP financed and (almost) completed
- Statement of Interest for proposal in the US to develop new high intensity EBIS/T for HIE-ISOLDE, FRIB, HRIBF and ISAC-II
 - Support letter ISC and ISOLDE
- UK Phd Student and Post-doc starting at ISOLDE in July
- WP in EUCARD proposal for R&D on thin film techniques
 - 1.5 MCHF in total budget (30% from EU)
 - 500 kCHF for HIE-ISOLDE relevant items (30% external)
 - Partners should be: IPJ-Polen, CI, LNL-INFN, IN2P3-IPNO, DESY
- Discussions with CERN Mgt on CERN contribution.



HIE-ISOLDE: Where are we?



		Swiss Francs			
		Still required		Received	
		Staff	Material	Staff	Material
		FTE	kCHF	FTE	kCHF
1a	LINAC prototyping and cryo design	0.0	425	5.5	
1b	LINAC 3.0 - 5.5 MeV/u	25.5	2,416		4,472
1c	Linac 5.5 - 10 MeV/u	19.0	3,350		
1d	LINAC lower energies	9.5	1,325		
1e	Beam lines for experimental area	1.0	0		500
2	REX trap and charge breeder	12.1	2,238		
3	TS consolidation		2,000		
	REX UPGRADE	67.1	11,754	5.5	4,972
4	Targets & Front-ends	25.8	8,040		60
5	PSB 900 ms	9.0	2,000		
	PROTON DRIVER BEAM	34.8	10,040	0.0	60
6	RFQ cooler	0.0	0		500
7	RILIS upgrade	0.0	0		2,400
8	High-charge state beams	1.1	800		
9	New HRS	0.8	1,100		
	BEAM QUALITY	1.9	1,900	0.0	2,900
10	Radiation protection consolidation	1.0	750		
11	Vacuum consolidation	8.5	2,408		
	CONSOLIDATION	9.5	3,158	0.0	0
	TOTAL	113.3	26,852	5.5	7,932
	Total Material		34,784		
	Total Personnel		10,000		
	PHASE I	27.5	5,591	5.5	7,932
	Total Material Phase I		13,523		
	Total Personnel Phase I		2,778		



HIE-ISOLDE: My comments on open issues



- The original cost estimate reflects well the cost for manufacturing e.g. a SC linac as the ISAC-II linac at TRIUMF
 - The cost estimate for *manufacturing* is probably within 10% of actual cost if compensated for inflation
 - CERN's mission is not to "*manufacture*" but to do "*R&D*" e.g. to push SC linac technology, the internal CERN HIE staff budget must be permitted to reflect this
 - The sharing of work on several institutes will result in additional costs
- The collaboration can ask for grants for hardware which isn't considered general infrastructure
 - 18.6 MCHF out of 34.4 MCHF in total material budget
 - Only very small staff contributions to be expected from users for staff working at CERN on technical items
- The cost of the experiments weren't included in the initial cost estimate, they should be included now
 - *In line with new project contribution model used for FAIR and promoted by OECD and IUPAP; investments in experiments and contributions with staff for running experiments are included in external contributions*