

ISOLDE scientific coordinator's report

ISOLDE Collaboration Committee, 15 February 2007

L.M. Fraile, CERN PH/IS

Impact of technical issues
Running statistics 2006
Planning for 2007

- ✓ Switchyard was blocked
 - deflector at GHM bent when repaired
- ✓ Line polarity left inverted from 2005
- ✓ Tape station not working
- ✓ Compressed air
 - The white powder phantom
 - Problematic target changes (i.e. UC_x-W 322, 10 May)
- ✓ Broken CeO HP 319 target + other (HV)

CONSEQUENCES

IS427	cancelled	11 shift lost	<u>rescheduled</u>
IS401/442	modified physics aim	+ lost 2.5 shifts	
IS358	no physics outcome	+ lost 4.5 shifts	[also RILIS]
IS383/428	cancelled	17	<u>rescheduled</u>
IS413	little physics outcome	5	[also power cuts]
IS442	modified collections	3	

Failures 2006: CERN Power cuts

- ✓ 15 May ~ 6:40
- ✓ 16 May ~ 14:00
 - Ventilation PLC problem already appeared (security chain)
 - GPS survived / HRS (UC W 272) affected (IS413/IS442)
- ✓ 17 Jun ~ 2:40
- ✓ 22 Jun ~ 1:40
 - 23 Jun, ventilation problem (security chain)
 - Delays, shortened runs
- ✓ 29 Jul ~ 7:45
 - Again VENTILATION controllers (PLCs)
 - It had happened before (see above), took until 4 Aug to repair
 - IS397 + REX-MD cancelled
 - IS413 cut short
 - IS434 (15 shifts) cancelled + IS368 not successful

Main failures 2006: Beam issues et al.

✓ Beam issues

- Beam sent to ISOLDE without request, 19 Jun 2006
 - Seen by contaminants on stable beam tuning
- Focused beam on Ti W 323 target [IS437]
- NORM beam (not staggered) onto Pb HP 256 [IS360/IS448 saved!]
- Steering due to MBL201 losses / beam on converter
 - UC W n q 338, beam on target [IS411]
 - Protons hitting the target and not converter, UC W n q 330 [IS411]

✓ BTY.QDE209 leak

- 10 days to repair
 - IS397 cancelled + REX-MD (simultaneous EBIS cathode problem)
 - Delays IS393/IS413 and following week

✓ Robot (target handling)

- Delays, UC W n 330
 - IS413 cut short, IS393 affected (ended by power cut)

✓ Other: HV, target heating...

Request for Schedule 2006

- ✓ Requested = **481** shifts
 - Schedule allows up to 350
- ✓ Maximum 10 UC_x targets (+ developments)
 - Requests ~ **265 shifts**
- ✓ RILIS operation
 - Requests for 2006 amount to **230 experiment shifts**
 - More than 2000 hours on line (exp. + dev. + prep.)
- ✓ REX-ISOLDE
 - Beam requests = **174 shifts**
- ✓ Operations limited
- ✓ Target development

ISOLDE beam time summary 2006

✓ ISOLDE delivered **350.5** RIB shifts

→ 280 (80%) experiments INTC

→ 70.5 (20%) other

- Standard target check + TISD + REX-MD
- Coordinators reserve: recovery, LoIs

→ 34 research projects (“experiments”)

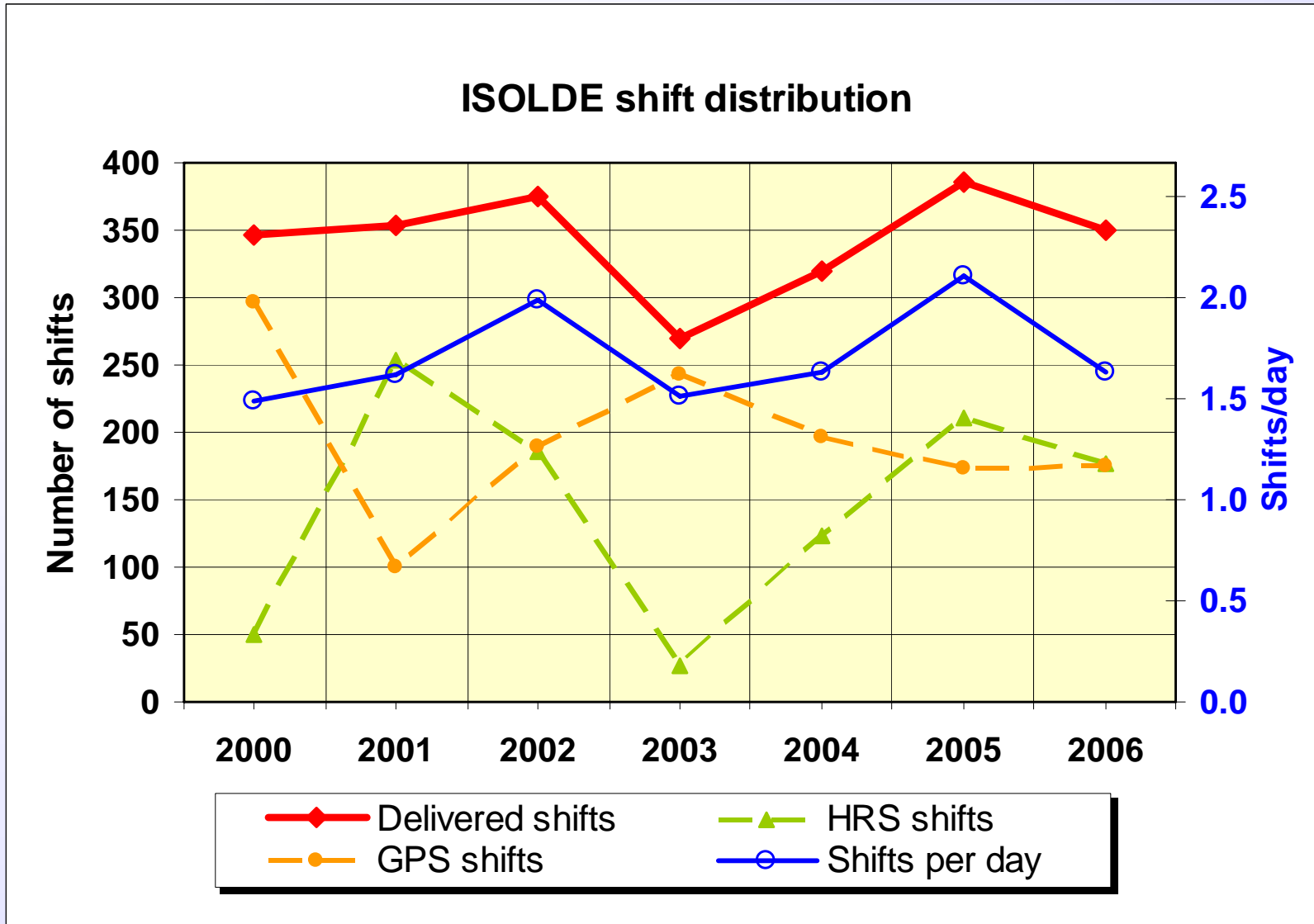
→ Integrated # protons = $7.55E+19$

- Indicator... (cf. Ti target)
- Far from $2E+20$ radioprotection average limit
→ flexibility required

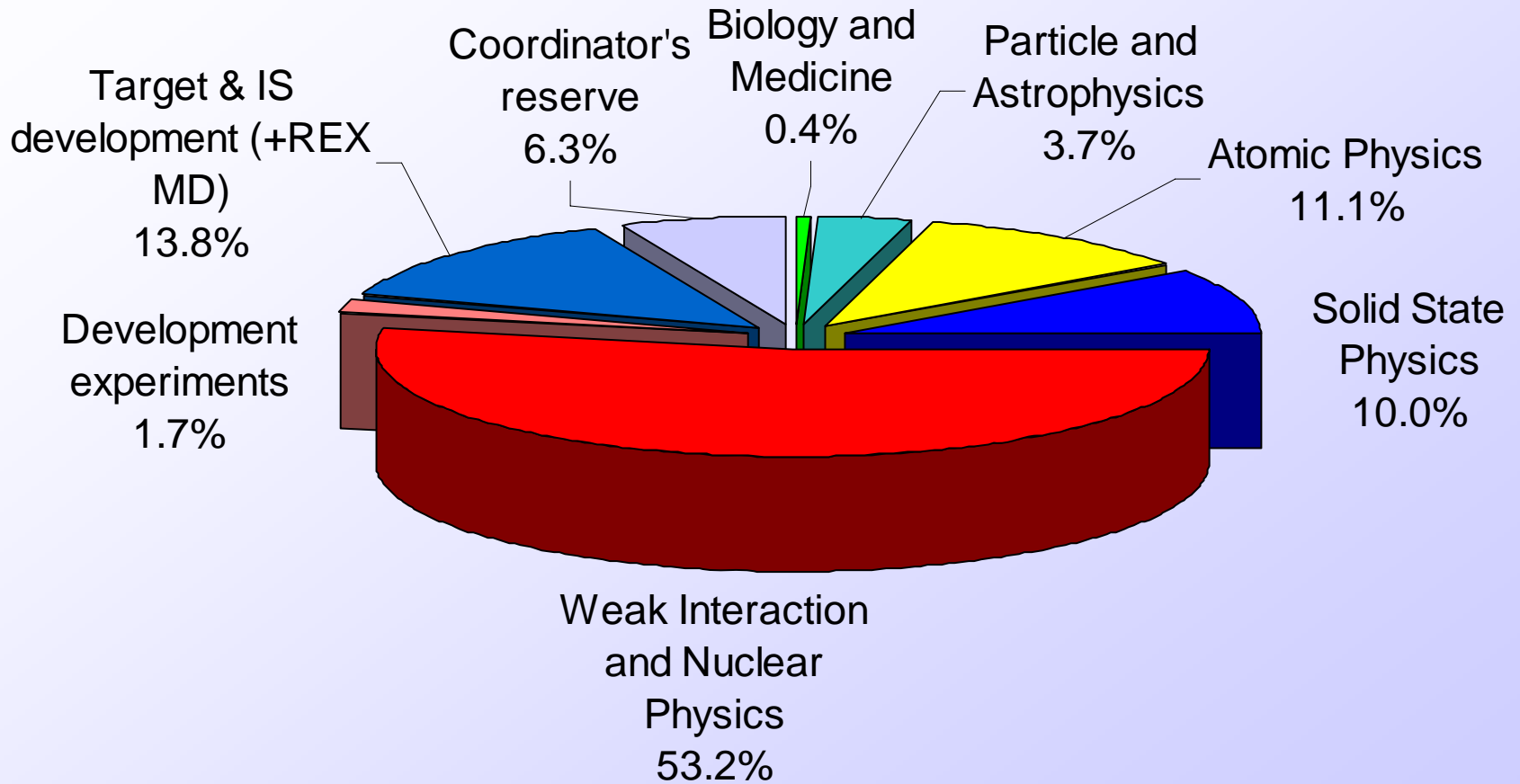
→ Recovered from the middle of the year

→ Running for 214 days (includes extension)

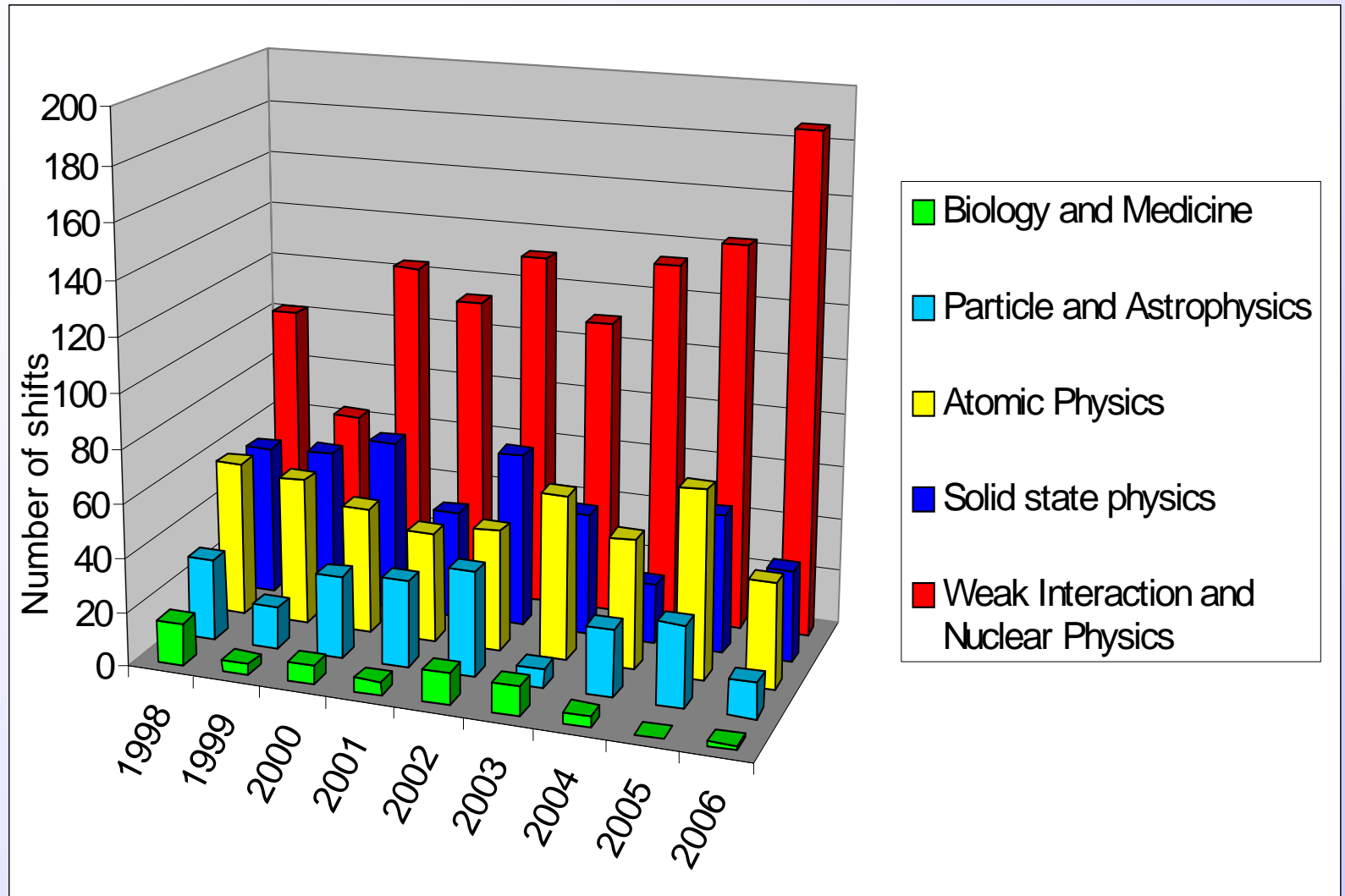
- 183 in 2005



ISOLDE shift distribution 2006



Shift distribution 1998-2006



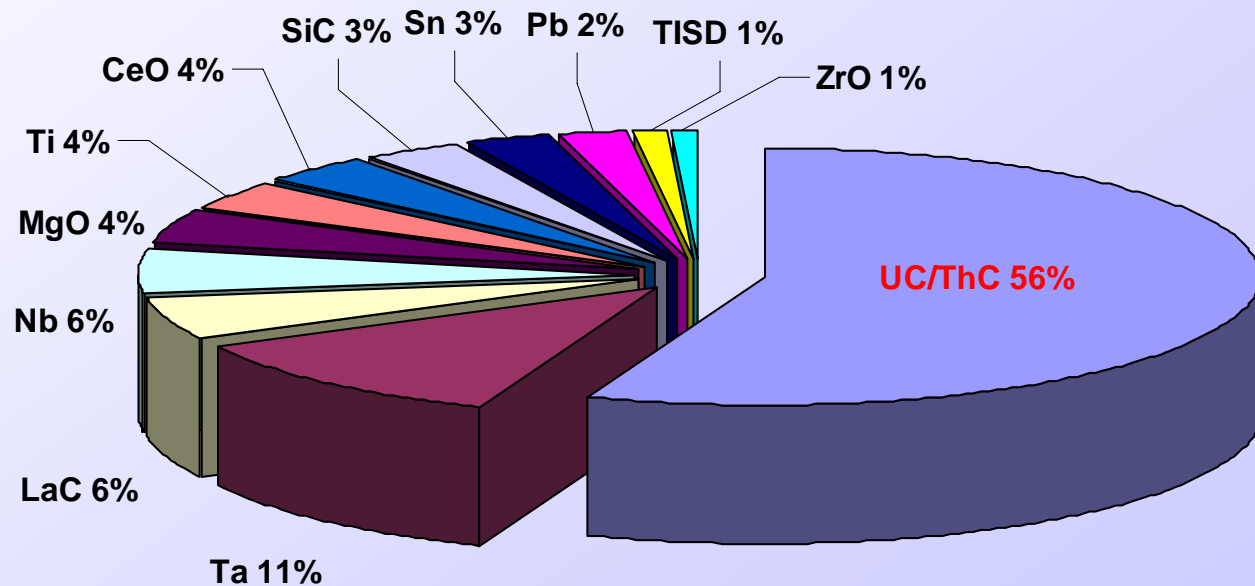
Key resources: targets

✓ Actinide targets

→ 196 shifts (out of 350.5) [56%]

→ 11 new units (includes prototypes)

Target distribution 2006



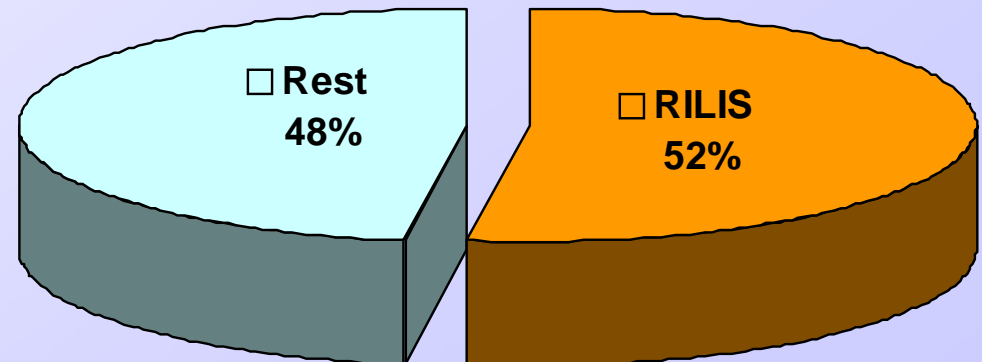
→ Fabrication for 2007 started

Key resources: RILIS

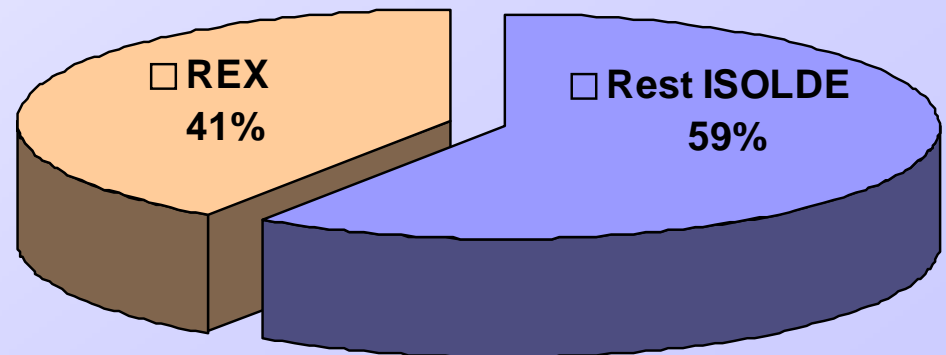
- ✓ 164 total RIB shifts
 - 146.5 shifts for INTC shifts
- ✓ 2132 hours for online work
 - includes setup, etc
 - 120 h offline (development Hg [Po], offline Cu)
- ✓ 20 IS projects + 1 LoI

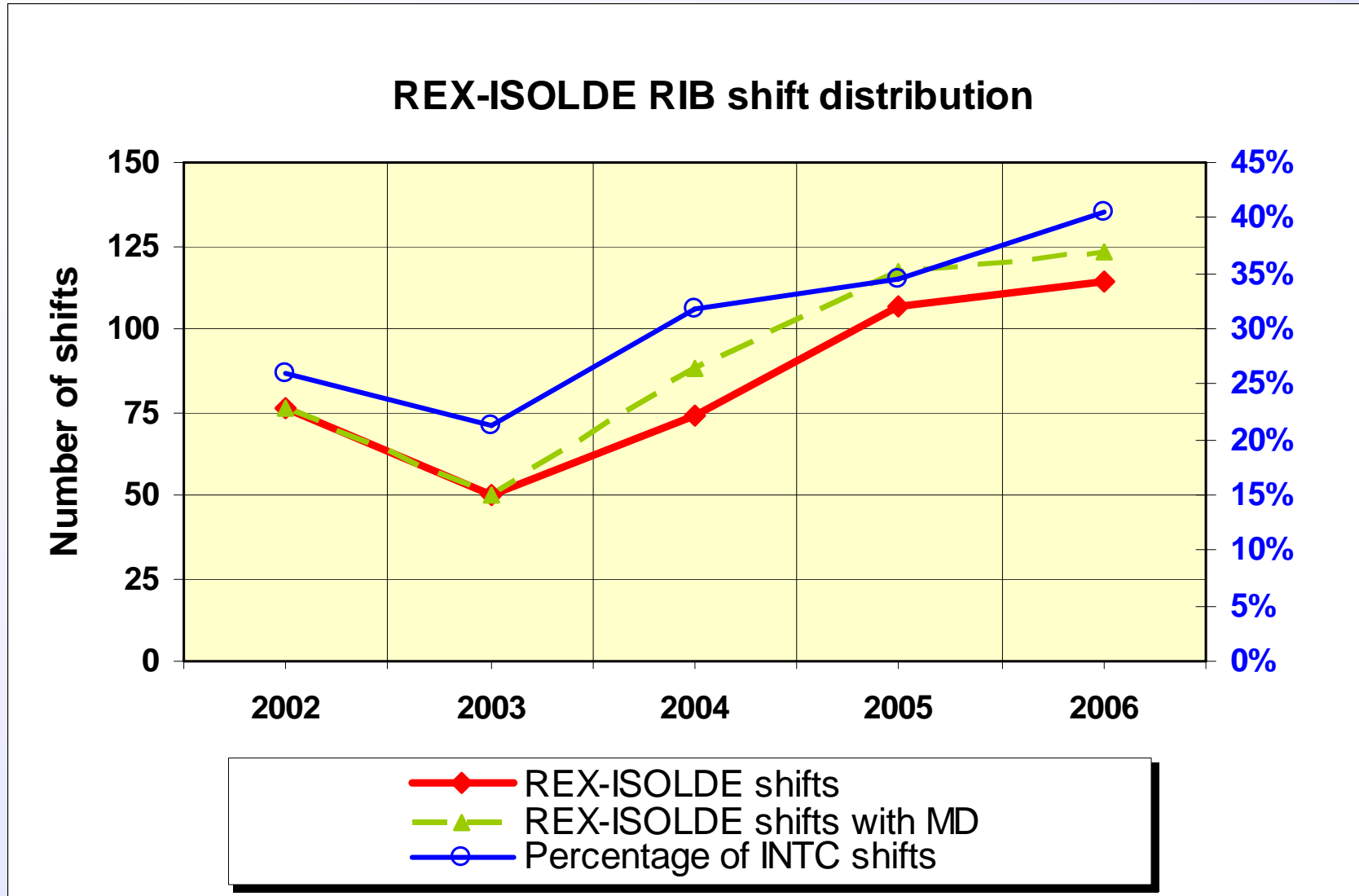
Beams: Mg, Cu, Ag, Mn,
Zn, Cd, Sb, Sn, Po, Be

RILIS % from *INTC* shifts 2006



- ✓ 114 RIB shifts delivered to experiments
 - 9 more RIB shifts for development
 - Stable beam, setup time ...
 - 11 experiments
- ✓ Allocated time for REX-MD
 - Optimized setup/tuning by REX machine supervisors
- ✓ $E \leq 2.9$ MeV/u
 - Limited energy [9-gap]
 - $E=3.15$ MeV/u (^8Li)
- ✓ Efficiency $> 5\%$ average
 - Range 2.8% - 9.6%
- ✓ Reliable
 - Good success rate

REX % from *INTC shifts* 2006



✓ New REX radioactive beams for Physics in 2006



✓ 45 radioactive isotopes of 17 elements

→ 5 years after 1st post-accelerated RIB (30 Oct 2001)

✓ Charge breeding of heavy elements successful

✓ Other developments

Users input for ABOC/ATC days

- ✓ Need of technical and experimental area support
 - “... in house groups do an excellent job but there are not enough to deliver extended support to external users...”
 - “Complicated” facility
 - Facility needs to be continuously manned 24 h
 - First step is routine presence of operators
 - Friday 17:00 (+weekend) effect
 - Seen in standard runs
 - Enhanced in the event of serious problems: power cuts!
 - Presence of technicians in the experimental area
 - Especially for new groups
 - RP support for physics
 - Communication (users)!
 - ISOLDE technical teams
 - PSB i.e. changes of SC

- ✓ Impression that the aim of all activities (i.e. Physics) is lost between the different activities
 - Segmentation of activities at CERN
 - Each link of the chain not always know what the rest is doing
 - Need of integration of activities at the technical level
 - Daily nuts and bolts level
 - Supervision
 - Assure transfer of know-how
- ✓ Standardize maintenance
 - High priority items for ISOLDE are done with low priority
 - “Lower” priority items not done
 - Recurrent requests/needs by users not implemented
 - HRS slit system, REX timing signals...



Users input

✓ Shutdown

- Need a share of high priority
- Establish standard procedures and tests
- Further hands-on integration

✓ Running period

- Assure overlap between different subtasks
- Avoid scattering of responsibilities
- ISOLDE as whole machine (targets, low E, REX...)

✓ User support

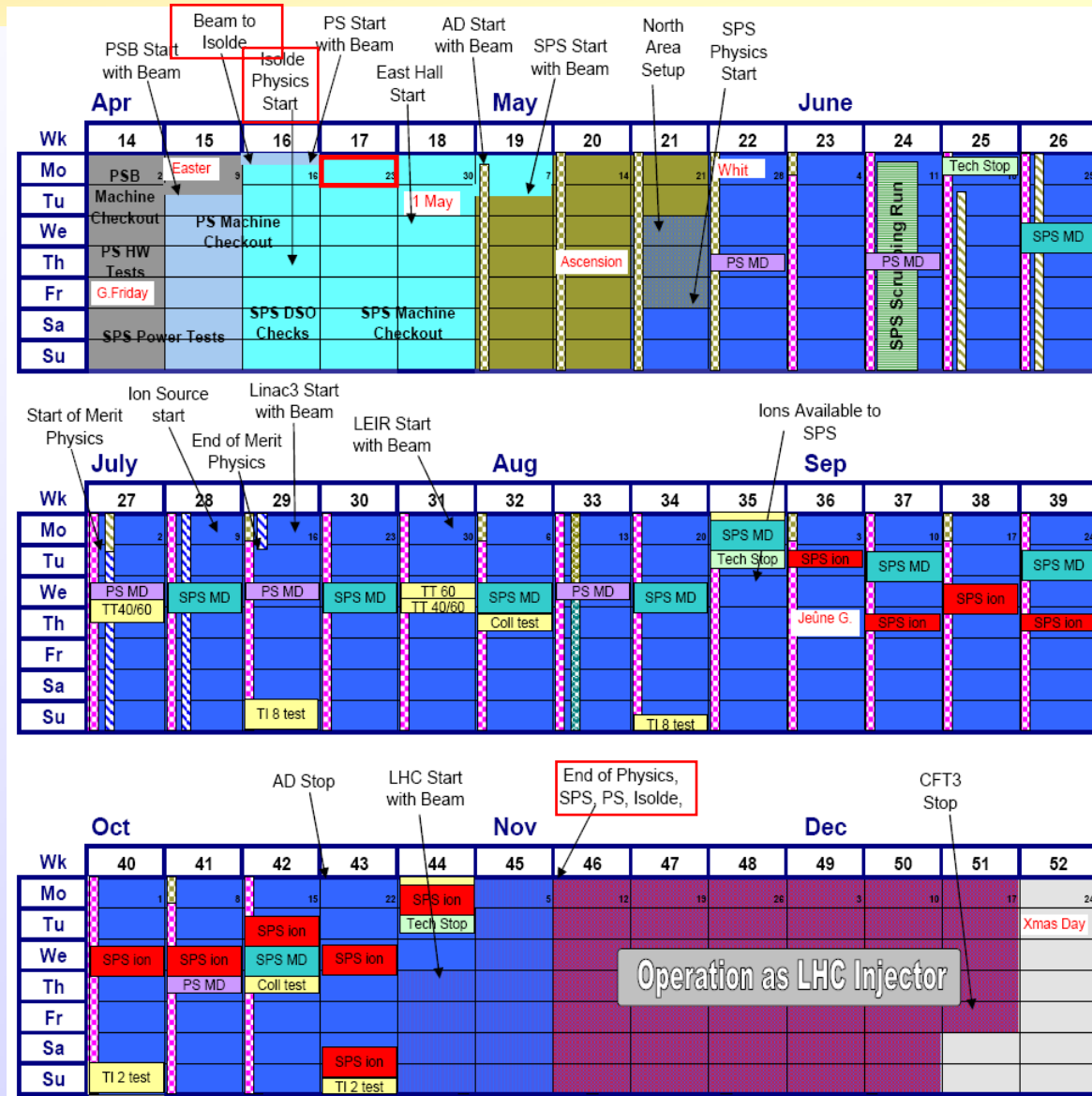
- Support for physics in the experimental area
- (Need RP support)
- Favour contact users ↔ ISOLDE groups

Accelerator schedule 2007

Approved 29 Nov 06

- ✓ ISOLDE dates 2007
- Protons start **16 Apr**
- Physics start **23 Apr**
- Protons stop **12 Nov**
- i.e. **29** weeks for Physics

Expected frequent changes of supercycles (as 2006)



ISOLDE schedule 2007

- ✓ Support restricted by LHC startup
- ✓ Limits in key resources
 - RILIS
 - UC_x
- ✓ REX available end of May
 - Miniball ready for Physics ~25 June
- ✓ Schedule:
 - 580 RIB shifts left for approved experiments
 - New proposals and addenda INTC 15-16 Feb 2007

Other issues

- ✓ List of ISOLDE users
 - compiled for MoU
 - input requested to spokespersons
- ✓ List of publications
 - requested to spokespersons
- ✓ Safety structure
- ✓ CERN Users office
- ✓ “Minimove”