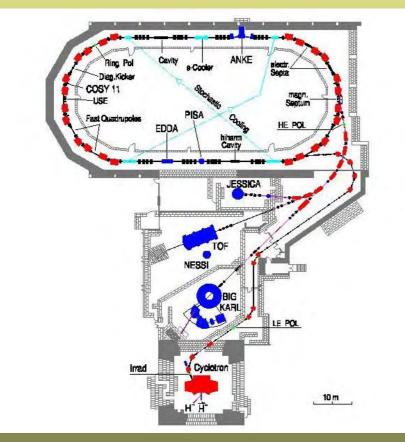
a High Performance Accelerator for Fundamental Research

The Accelerator Facility
Beam time Distribution and Statistics
Failure Analysis
Preventive Work for High Reliability
Procedures after a Breakdown

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The Accelerator Facility

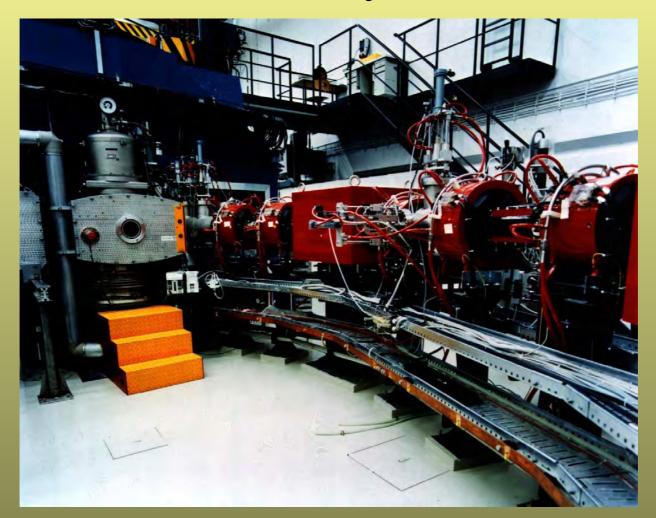


- COSY accelerates

 (polarised) protons and
 deuterons between 300
 and 3600 MeV/c
- 4 internal and 3 external experimental areas
- Electron cooling at low energy
- Stochastic cooling at high energies

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View into the Cyclotron Hall



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The View into the Synchrotron Hall



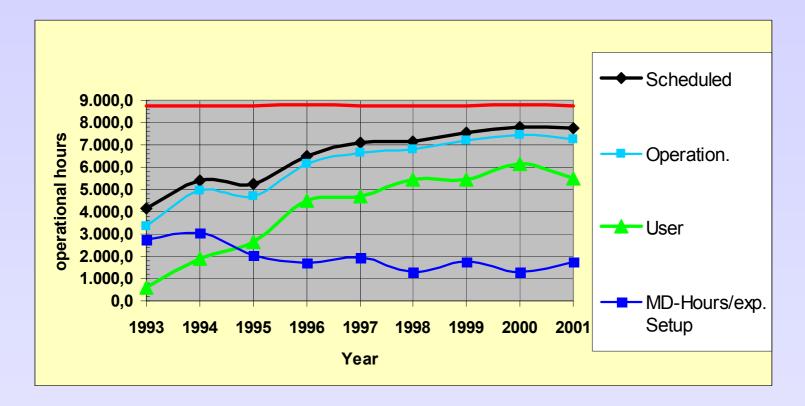
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Beam time Statistics

Year	Scheduled	Operation.	Operation.	User	User	MD-Hours/exp. Setup
	Hours	Hours	%	Hours	%	
1993	4.166,0	3.355,0	80,5	617,0	18,4	2.738,0
1994	5.398,0	4.951,0	91,7	1.889,0	38,2	3.062,0
1995	5.256,0	4.697,0	89,4	2.654,0	56,5	2.043,0
1996	6.520,0	6.171,5	94,7	4.484,0	72,7	1.687,5
1997	7.080,0	6.634,0	93,7	4.675,5	70,5	1.958,5
1998	7.148,0	6.787,0	94,9	5.470,0	80,6	1.317,0
1999	7.536,0	7.220,0	<mark>95,8</mark>	5.464,0	75,7	1.756,0
2000	7.776,0	7.457,5	95,9	6.164,0	82,7	1.293,5
2001	7.728,0	7.251,5	93,8	5.522,0	76,1	1.729,5
Sum tot.	58.608,0	54.524,5	93,0	36.939,5	67,7	17.585,0

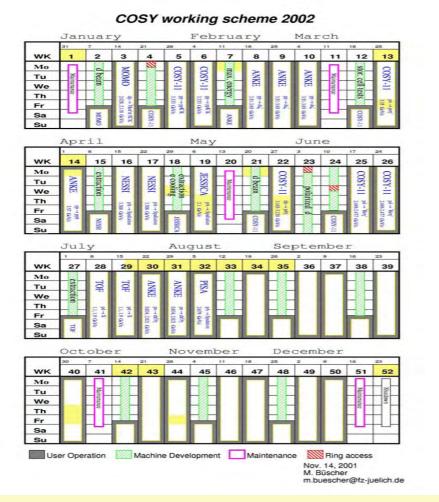
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Beam Time Development over the Years



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The COSY Beam Time Schedule



- Every 10th week is a shutdown period for maintenance
- Machine development weeks give the opportunity to prepare the next experimental set-up

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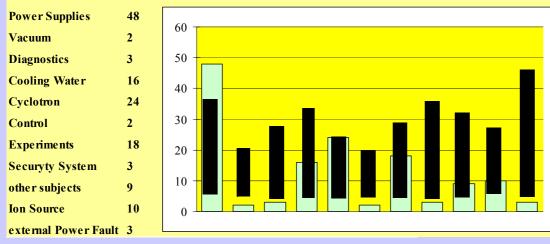
Critical components

- 100 dynamic power supplies
- 250 static power supplies
- 500 CPU's and 200 VME/G64 crates
- 280 Vacuum pumps
- 20 Cryogenic pumps
- 100 Valves
- 2 fast shutters

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Failure Analysis

No. of Breakdowns



Duration of Breakdown / h Power Supplies 69,5 140 Vacuum 1 120 Diagnostics 16 **Cooling Water** 100 45 Cyclotron 80.5 80 Control 3,5 60 **Experiments** 127 40 Securyty System 2 20 other subjects 40 **Ion Source** 22.5 0 external Power Fault 31

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Information about the COSY status on the web

Adresse 🖉 http://donald.cc.kfa-juelich.	de/world/cosy_state.html				💽 🔗 Wechseln zu 🗍 Lir
	Forschungszentrur	m Jülich	9		
	COSY-STATE (01.0	2.2002	19:53:03	0	
	Supercycle consisting o	of exp. # 2	exp. # 4		
	Momentum (MeV/c)	3333	3333		
	Cycle time (s)	20	1820		
	Intensity (protons) for experiment	3.17e+	10		
	User	COSY 11 (internal) ON 0.99		l)	
	Stochastic Cooling				
	Macroscopic Dutyfactor				
	access to the inner hall allowed for	7x24		h/week	
	restricted access to the	e inne	r hall j	possible	
	beam time schedule of t	he next 2	weeks		
	Intensi	itar			
	Beam Cu				
	Timing St	tatus			
シ 🔭 😋	-52				
Home IKP	Search				
					Lokales Intranet
	Dieter Pra	asuhn			
					Echnicary 4th 2002
	ARW	V			February 4th, 2002

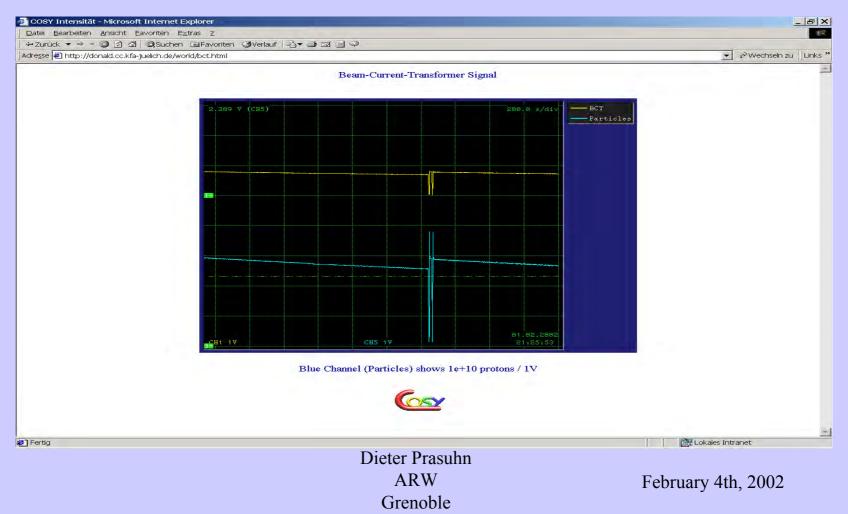
Grenoble

The status of the timing is available on the web

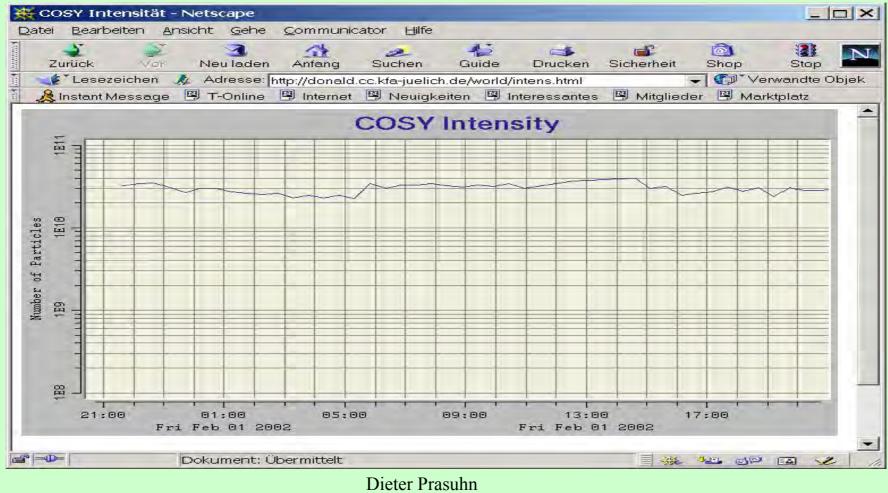
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Zurück Vor	Neu lad				e Drucken Siche W_Grenoble/Timing.ht		Stop	-
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iming Sender St icro Pulsung at speriment-Liste	ıs : 2 4	ft ERIMEI	NT: 2					
	Impul	s: 3333 N usdauer:	MeV/c					
Name	Zeit/ms	Timer1	Timer2	Status	Aktiv			
liagnose	0	302		820	1			
Pulsgenerator	3	600			1			
dipolstart	4	101			1			
Tims-warte1	5	601			1			
poco-start	7	100	100		1			
FimsWarte2	8		602		0			
Dyntune	85	307			0			
sc_motor	3101	901			0			
IF_kurz_01	3140			821	1			
HF_offen_01	3900			820	1			
BPM	5040	301			0			
HF_kurz_02	5200			821	1			
cosy11_start	7000			402	0			
Cosy11_stop	12000			401	0			
	18100			820	1			
HF_offen_02								
	T 1	: Übermitte						

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The intensity in the running cycle is available via web



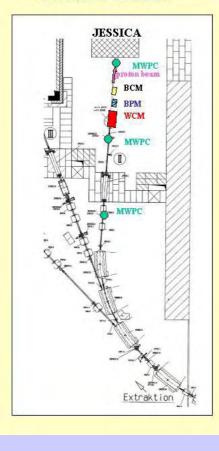
The intensity over a long period is recorded and available via web

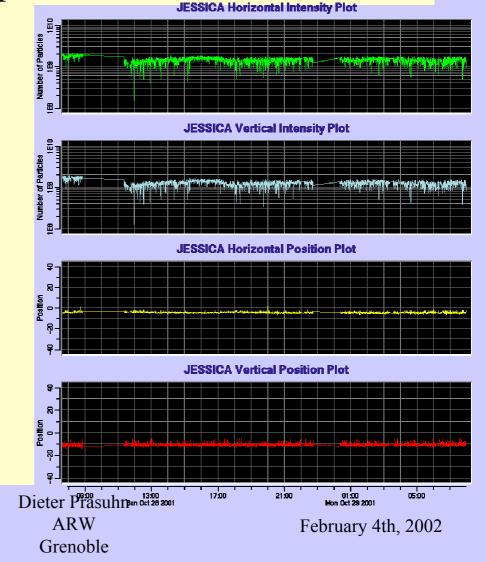


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Monitoring of Intensity and Position of the pulsed beam

Beamline to JESSICA





The COSY Operating Crew

• 10 operators

From Monday to Friday 3 shifts per day, on Saturday 2 shifts

From Saturday 22:30 to Monday 6:30 one operator on call

• 10 supervisors

In the Control room during day time in the MD-weeks, one is on call all time

- 30 people technical support staff
- Available during normal working time, on call all other time

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Preventive Steps for high Reliability

- Conservative layout of all components
- Regular maintenance time
- Checks of all aging components:
 - \checkmark Electrical connectors
 - \checkmark Water connectors
 - \checkmark Fans in the CPU-crates
 - \checkmark Search for irradiated vacuum chambers

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Procedures after a Breakdown

- The operators or supervisors in the control room receive messages about faults
 - Cooling water temperature
 - Status of power supplies
 - Vacuum

-

• If necessary they can immediately call the requested technical staff on call the to react on the fault

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Advices from our electrical engineers

- Choose well established technologies whenever it is possible
- The design should include 20% reserve
- Consequent separation of power lines and low level signal and control lines
- Keep enough spare parts for quick repair (10% of all power components)
- Regular careful maintenance

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