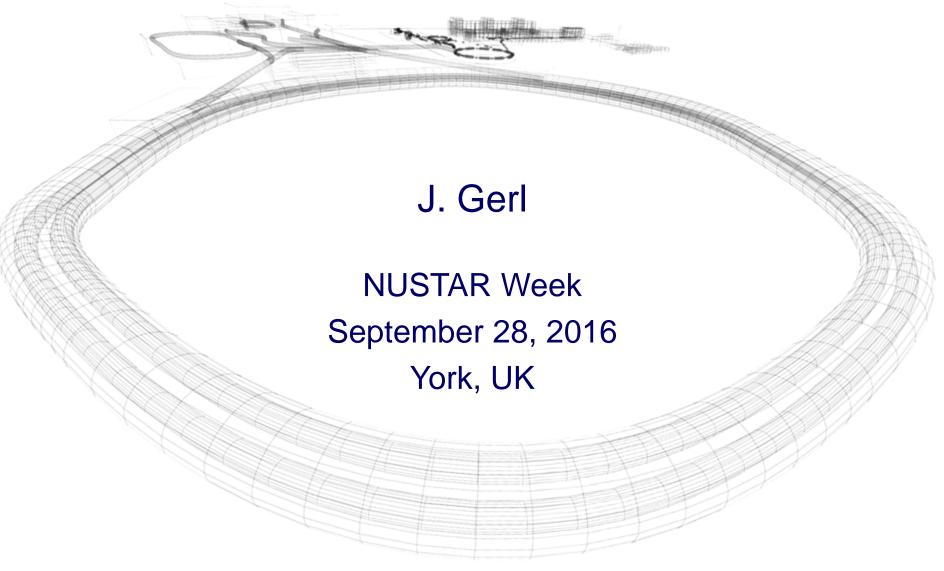
News from GSI/FAIR & NUSTAR

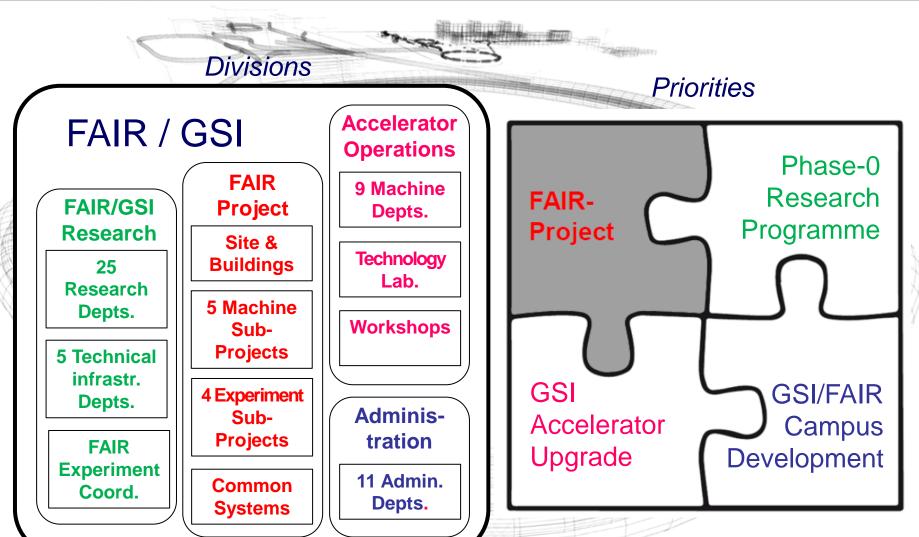




FAIR NUSTAR JG

New FAIR/GSI Organisation





FAIR Civil Construction



Final BMBF signature for 1. stage of construction funds obtained in September 13

Tendering just started

Construction work for adoption and enforcement of SIS18 just started

Full scale construction work to start in Summer 2017

G0702A (T101)

G0418A (T108)

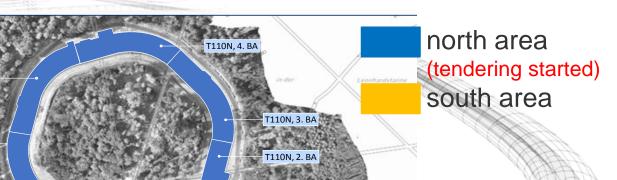
H0417A (G009)

K0406A (G050)

H0307A (T106)

G0704A (G004A) H0705A (G004)

... Realization along the beam line



H0719A (G017.1) K0720A (G017A)

L0516A (G018)

K0619A (T112)

K0617A (T104)

Construction readiness for the different buildings expected until 2022

First beam at FAIR facility wanted in 2022

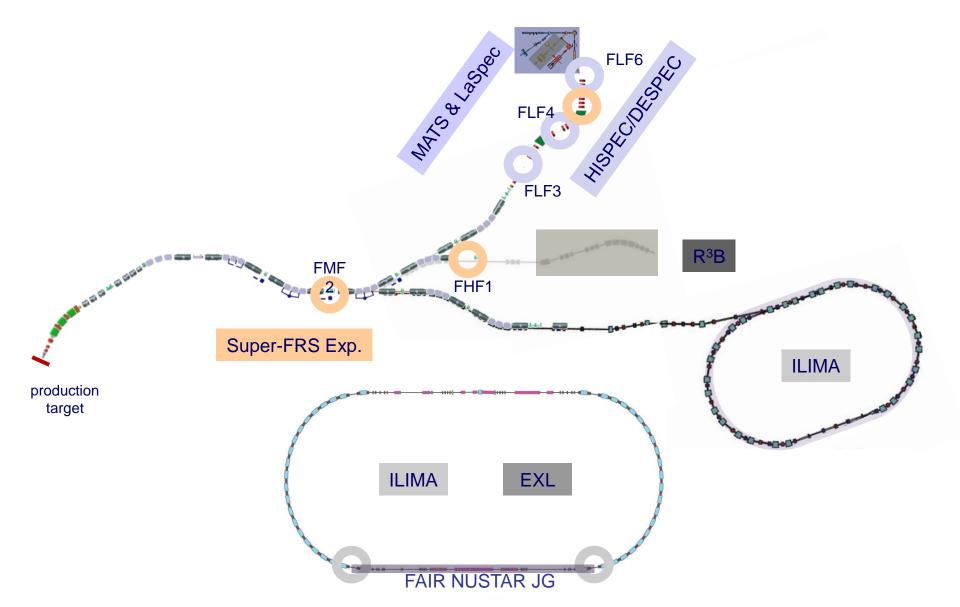
FAIR MSV project completion by 2025

FAIR NUSTAR JG

H0209A (G007)

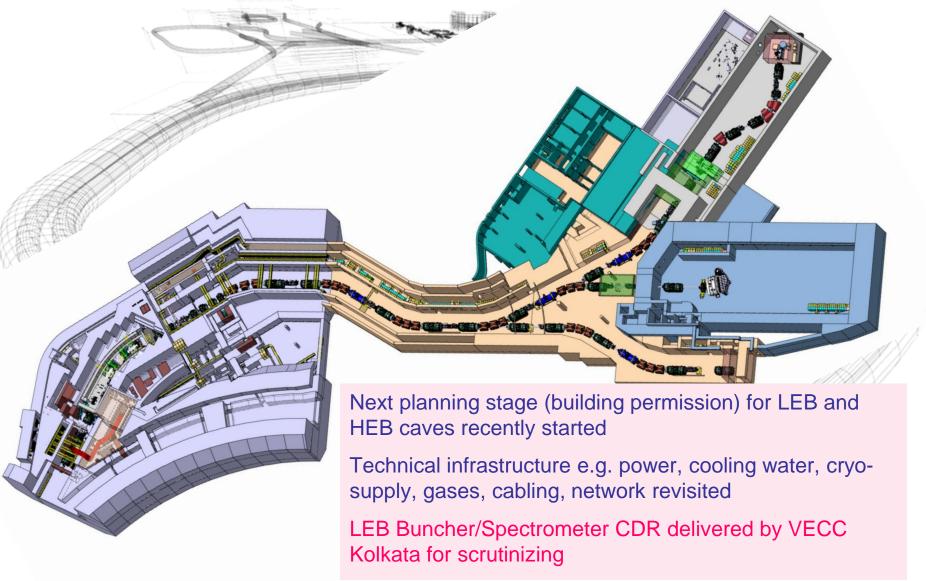
NUSTAR Experimental Sites





Super-FRS and NUSTAR caves





FAIR-NUSTAR Planning



Scope of planning

ATB (Along the Beamline) - Component List

WBS (Work Breakdown Structure) - Work Packages and Responsibles

Project Plan - Resource Loaded Time Schedule

Your input is required!!!

Is the component list complete?

Is the work package list complete, and are the work package leaders appointed and active?

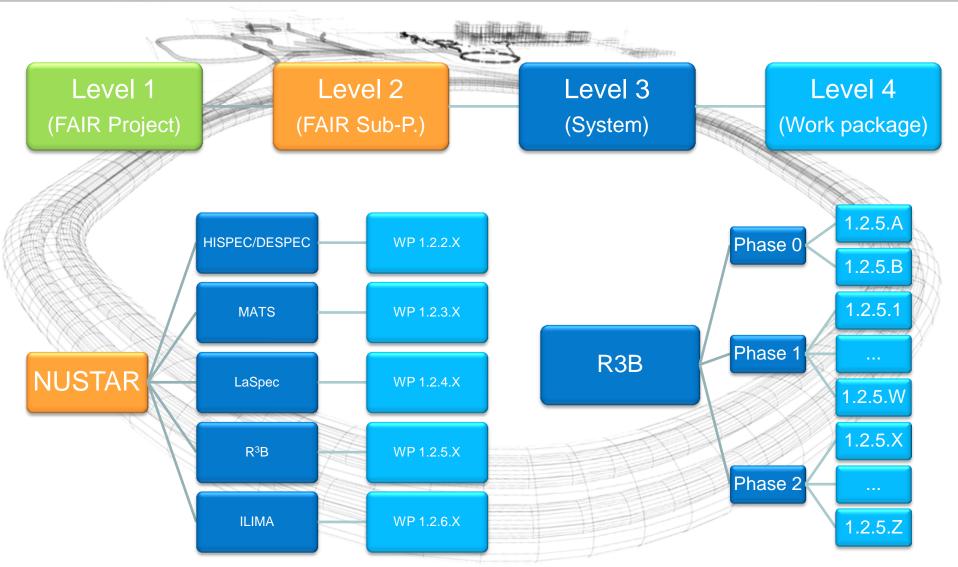
What is the status (time, resources, quality) of the work packages, components, sub-systems?

Please be responsive and pro-active!

...All documentation can be found and shall be available in EDMS

Planning Details





FAIR NUSTAR JG

FAIR-NUSTAR Planning Facts



Resources

FAIR funding requires

Approved TDR

FAIR Council assignment

Signed in-kind contract

All other funding should be based on

Approved TDR

MoU or other agreement

Schedule

FAIR planning incorporates

Experiment time plans down to level 3-4

Time plans need to be kept up-to-date

Planning includes installation at FAIR

Quality assurance

FAIR requests

Qualified FAT/SAT (keep it is light as reasonable)

Proper documentation (use EDMS)

Adherence to approved safety conditions

LEB/HEB Installation



Proposed sequence

- 1. Local cryogenics
- 2. Media lines and connections
- 3. Racks (for control)
- 4. Cables and networks
- 5. Magnets and other mechanics (order not considered critical)

Experimental set-up

Lead time for installation start is assumed ≈1 year before cryo and S-FRS beam become available

Your input is needed:

What hostlab installation assistance will be required?

What will be the initial experiment set-up?

Is there any critical installation issue to be considered?

NUSTAR Time Line



NUSTAR Phases



Phase 0

R&D and experiments to be carried out with present facilities (GSI and others) and FAIR/NUSTAR equipment (basic set-ups)

Phase 1

- Core detectors and subsystems completed
- First measurements with FAIR/Super-FRS beams
 - Carry out experiments with highest visibility as part of the core program and within the FAIR MSV ("day-1")

Phase 2

- FAIR evolving towards full power
- Completion of experiments within MSV
 - > Essentially the full program of MSV can be performed

Phase 3

 Moderate projects, which have been initiated on the way (outside MSV) can be included (e.g. experiments related to return line for rings or R³B spectrometer)

Phase 4

Major new investments and upgrades for all experiments

Beam time FAIR Phase-0



Officialy announced as planning basis

Calender year	2018	2019	2020	2021
beam time commissioning/equipment tests [months]	1.5	1.5	1.5	1.5
beam time experiments [months]	3	4	4	4
Total beam time [months]	4.5	5.5	5.5	5.5

Call for proposals by end of 2016; PAC Meeting in Spring 2017

Beam time 2018

2018	Version vo	m 06.07.20	16 (S.Rein	nann)										_					
								F	ERIEN										
		Jan	Feb	Mar	Apr	May	Jun	Ju	ul	Aug	Sep		Oct		Nov		Dec		Einschränkungen für Experimentbetrieb
IQ		Shutdown	1			MC	BC	MK N	ИΚ	BT	MK		T	S		ИΚ	Shutdown		keine
UNILAC		Shutdown	1	HF-Test		MC HC	BC	MK N	ИΚ	BT	MK			-		МK			im Langpulsbetrieb nur A3 Energie
SIS18		SIS18 upg	rade inkl.	periodisc	he Dry R	uns MC	BC	MK N	ИΚ	BT	MK			1		МΚ			für 2-3 Monate max. 2 Experimente gleichzeitig
HEST		Periodisc	he Dry Rur	ns (3-4Tag	e am Sti	ück) MC	BC	MK N	ИΚ	BT	MK			-		МΚ			keine
ESR		Periodisc	he Dry Rur	ns (3-4Tag	ge am Sti	ück)		MC		BC	MK	ш.		٠		ИΚ			nur Speicherbetrieb mit interem Target
CRYRING		Periodisc	her Teststr	rahlbetrie	b local (2x4 Woche	en am	Stück) MC		BC								kein Experimentbetrieb möglich
														\perp					
MC	Machine Cl	heckout = 1	rockenint	etriebnal	hme ind	. Kontrolls	ysten	n-/Bet	triebsso	oftware	e Inbetrie	bnah	nme						
BC	Beam Com	missioning	= Inbetrie	ebnahme	mit Stral	hl / Inbetri	iebnal	hme S	trahlwe	ege (Pr	imärstrah	ıl) mi	t Pilots	stra	hl, tim	ing	System etc	-	
MK	flex. MK-Be	eamtime (f	Maschinen	experime	ente, Ma	schinener	ntwick	lung,	Geräte	inbetri	ebnahme	n, Op	perate	ursa	ausbilo	dung	g, FAIR-Det	ektorentwi	cklung, Qualifizierung+Referenzmessungen)
BT	Beamtime	= Strahlzei	t für PAC-\	Vergabe v	orgeseh	en													
TS	Flexible te	chnische S	trahlunter	brechung	für Repa	araturen, S	oftwa	areup	dates u	sw. (al	s Block od	ier ve	erteilt)						
HC	HF-Konditi	onierung												П					

Accelerator upgrade measures



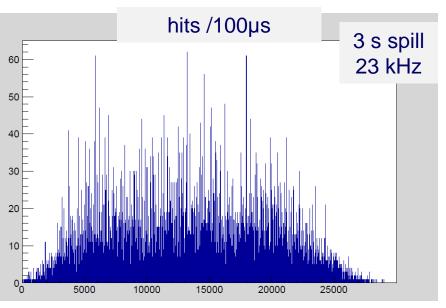


- Qualification of new UNILAC RF power station on Alavarez tank 3
- switch of SIS18 to FAIR control system, data acquisition and data setting
- assembly and commissioning of 2 new MA cavities in SIS18
- acceptance test of upgraded SIS18 dipole power converter system
- switch of HEST to FAIR control system, data acquisition and data setting
- Alignment SIS18, HEST, ESR after GAF-Project
- HEST-Upgrade for HADES beam line
- switch of ESR to FAIR control system, data acquisition and data setting
- repair of ESR electron cooler
- vacuum service ESR "Nordbogen"
- Commission of Cryring



Beam spikyness

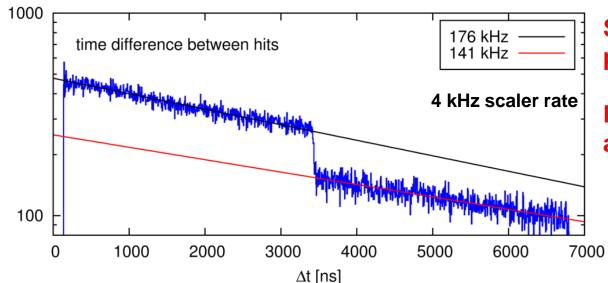




Coarse spikes with up to 100x hits compared to the mean value per 100 us interval.

Voids with up to 50% empty time intervals.

DAQ processing time: ≈ 100µs Only 1 hit /100µs contributes. Spikyness reduces data acceptance by up to a facotor of 3 !!!!



Severe overloading of particle tracking detectors!!!!

Reduced detection efficiency and reduced resolution!!!!

GSI accelerator WG initiated to solve the problem

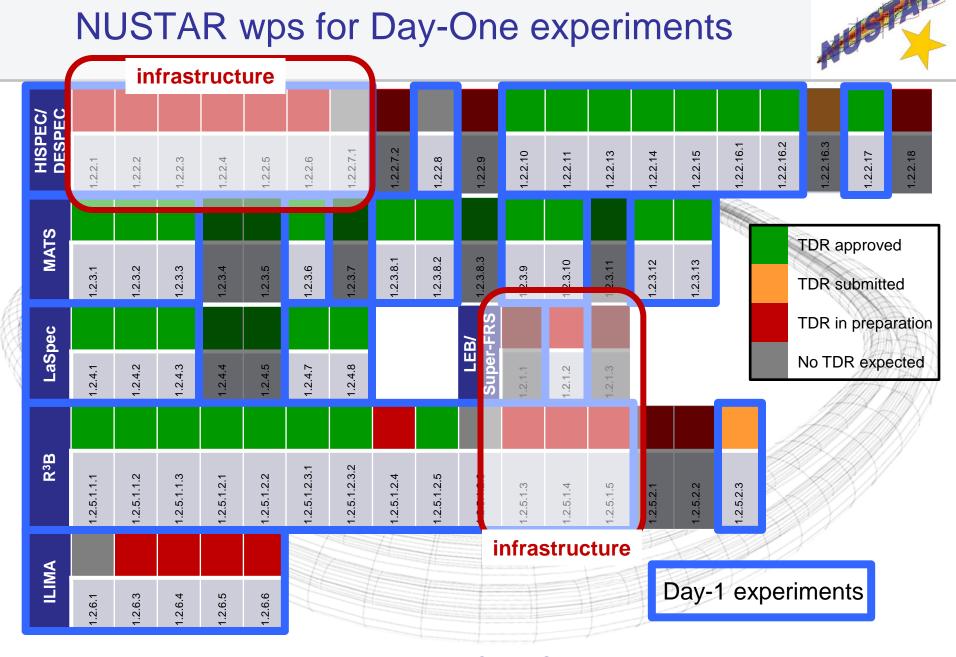
Estimated uranium beam intensity



Uranbetrieb		SIS operation today	SIS operation after upgrade (2017- 2021)	SIS operation booster mode >2021
Reference Ion		U ⁷³⁺	U ⁷³⁺	U ²⁸⁺
Maximum Energy		1 GeV/u	1 GeV/u	0,2 GeV/u
UNILAC Current		1 emA	3 emA	15 emA
Maximum Intensity per Cycle		4·10 ⁹	1,5·1010	1,5·1011
Magnet Cycle	Fast Extraction	2,2 s 0,46 Hz	0,37 s 1 Hz (*)	0,37 s 2,7 Hz
	Slow Extraction (5 s Spill)	7,2 s 0,14 Hz	5,37 s 0,19 Hz	-
Maximum Intensity per Second	Fast Extraction	1,8·10 ⁹ /s	1,5·10 ¹⁰ /s	3·10 ¹¹ /s (**)
Maximum Intensity per Second	Slow Extraction	5,6·10 ⁸ /s	2,8·10 ⁹ /s	-
Slow extr. efficiency		50 %	75%	

^(*) Limitiert, maximal möglich: 2.7 Hz

^(**) Determined by cycle time SIS100



Status Technical Design Reports (34 TDRs)



- Approved TDRs (16):
 - HISPEC/DESPEC (9) (LYCCA, Plunger, AIDA, BELEN, MONSTER, DTAS, DEGAS, FATIMA, NEDA)
 - MATS + LaSpec (1) (all subsystems)
 - R³B (6) (Multiplet, NeuLAND, CALIFA-barrel, GLAD, CALIFA forward endcap, tracking detectors)
- Submitted (2):
 - R³B (1) (Active target)
 - Super-FRS (1) (EXPERT)

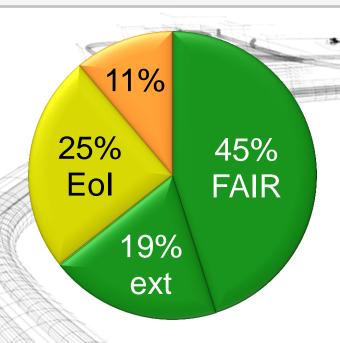
TDRs expected (16) (submission profile – September 2016)

additional TDRs from Super-FRS Experiments to be added

Q3-2016	Q4-2016	Q1-2017	Q2-2017
1	5	6	_

NUSTAR Funding Situation





- secured/expected FAIR
- secured external
- Eol
- to be assigned

FAIR shareholders and associates

- Finland
- France
- Germany
- India
- Poland
- Romania
- Russia
- Sweden
- UK
- Additional funding from:
 - Belgium
 - Bulgaria
 - Hungary
 - Israel
 - Italy
 - (Japan)
 - Spain
 - Turkey

FAIR NUSTAR JG

Funding by Countries



	LEB infra- structure	HISPEC/ DESPEC	MATS	LaSpec	R3B	ILIMA	total	secured	Eol	N/A
Belgium				153.8			153.8	83	71	
Bulgaria		16.3					16.3	16		
Finland		387.9	215.2	106.4			709.5	710		
France		20.0	43.9		2935.0	15.0	3013.9	2935	79	
Germany	1770.0	2296.5	2028.9	275.3	9027.0	922.0	16319.7	11434	4886	VF cap?
Hungary					14.9		14.9		15	
India		2376.0	133.4				2509.4	2010	499	
Israel		25.0					25.0		25	
Italy		50.0					50.0		50	
Poland		500.0					500.0	500		
Romania		1822.5					1822.5	1823		
Russia			190.5		2994.3		3184.8	1000	2185	prio.?
Spain		3092.2	132.7		1279.9		4504.8	1669	2836	
Sweden		1008.6			1800.0		2808.6	2800	9	
Turkey		88.5					88.5		89	
UK		2687.6		91.8	2213.4		4992.8	4501	492	
N/A	1100.0	905.0	148.1		1996.3	965.0	5114.4			5114
total	2870.0	15276.1	2892.7	627.3	22260.8	1902.0	45828.9	29481	11236	5114

NUSTAR funding for Day-One experiments infrastructure HISPEC/ DESPEC 100 100 100 96 100 94 77 79 88 0 .2.2.16.3 2.2.16.1 .2.2.7.2 1.2.2.7.1 1.2.2.10 .2.2.13 1.2.2.15 .2.2.11 1.2.2.14 2.2.2 2.2.6 1.2.2.8 N. 2.2. N. 100 100 15 29 9 14 0 MATS > 80% secured 2.3.8.2 2.3.8.1 .2.3.8.3 .3.10 1.2.3.13 .2.3.1 2.3.2 2.3.5 1.2.3.6 .2.3.7 ~ 50 % secured < 20% secured 100 0 0 71 0 28 LaSpec LEB No funding required \sim 2.1. 10 100 0 100 100 73 36 100 0 95 2.5.1.2.3.2 2.5.1.2.3.1 2.5.1.1.2 .2.5.1.1.3 5.1.2.1 2.5.1.2.2 2.5.1.2.5 2.5.1.1.1 2.5.2.2 .2.5.2.3 5.1.4 2.5.1.5 5.1.3 infrastructure 28 85 51 28 ILIMA 1.2.6.6 1.2.6.3 .2.6.5 .2.6.1 1.2.6.4

In-kind and Collaboration Contracts



Country	Description	in-kind value	requested?	specs?	contract?	signed?	status
France	GLAD	2530.0	yes	no	no	no	Annex 2 and detailed technical specs in preparation
	DAQ electronics	330.0	no	no	no	no	TDR in preparation
Carmany	GLAD	2530.0	yes	no	no	no	Annex 2 and detailed technical specs in preparation
Germany	NeuLAND stage 1	390.0	yes	no	no	no	Annex 2 and detailed technical specs in preparation
	Vacuum systems	90.0	no	no	no	no	TDR in preparation
	NeuLAND - HV distribution system	415.0	yes	yes	yes	yes	Preseries delivered - 7 modules ok - 13 modules in testing
Russia	NeuLAND stage 1	585.0	standby	no	no	no	Detailed technical specifications in preparation. Set to Priority 2 . Wait for possible re-definition of content
	Proton arm spectrometer	489.3	yes	no	no	no	Decision in FAIR Council still required. To be done by written approval
	CALIFA barrel stage 1	399.2	yes	no	no	no	Annex 2 and detailed technical specs in preparation
Swadon	CALIFA forward endcap	250.8	yes	no	no	no	Contract with multiple providers possible? Chalmers to take the lead. To be clarified.
Sweden	R3B multiplet	75.0	no	no	no	no	Wait for clarification of overall funding
	Vacuum systems	20.0	no	no	no	no	TDR in preparation
UK	Silicon tracker	2213.4	no	no	no	no	TDR in preparation

FAIR Conclusions



- New organisational structure becomes effective
- Consolidated and ressource loaded planning of level 3/4 incl. installation prepared by mid September
- Final BMBF signature for 1. stage of construction funds obtained in September 13
- Tendering just started
- Full scale construction work to start in summer 2017
- Construction readiness for all the different buildings expected until 2022
- Construction work for adoption and enforcement of SIS18 just started
- Beams for FAIR Phase-0 experiments from 2018 on accepted by FAIR Council and GSI Aufsichtsrat
- First beam at FAIR facility wanted in 2022
- FAIR MSV project completion by 2025

NUSTAR Conclusions



- Planning and preparation for NUSTAR Phase-0 experiments at GSI from 2018 onwards has started
- Initial set-ups both for Phase-0 and Phase-1 need to be defined as soon as possible
- Input for FAIR planning from all sub-collaboration required. Please be supportive!
- Input for installation planning required. Please be supportive!
- All looks very promising now!!!