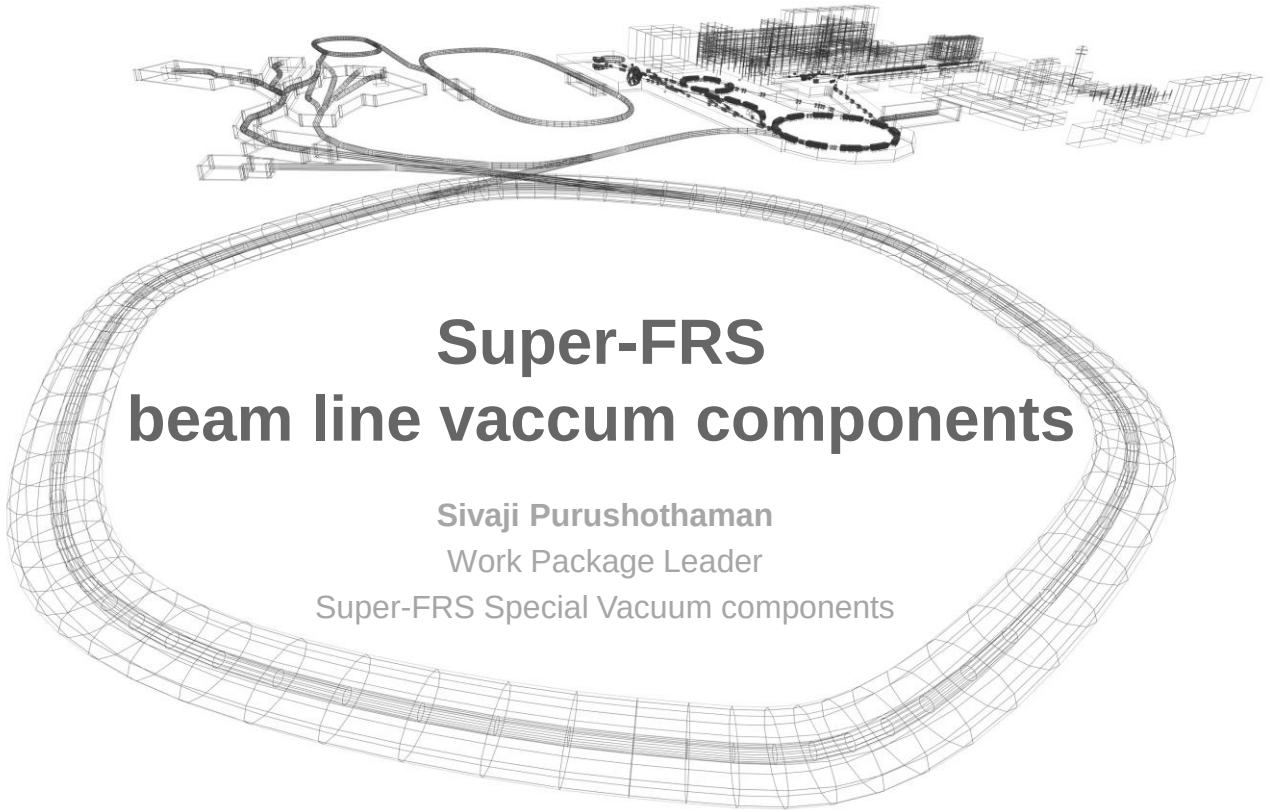


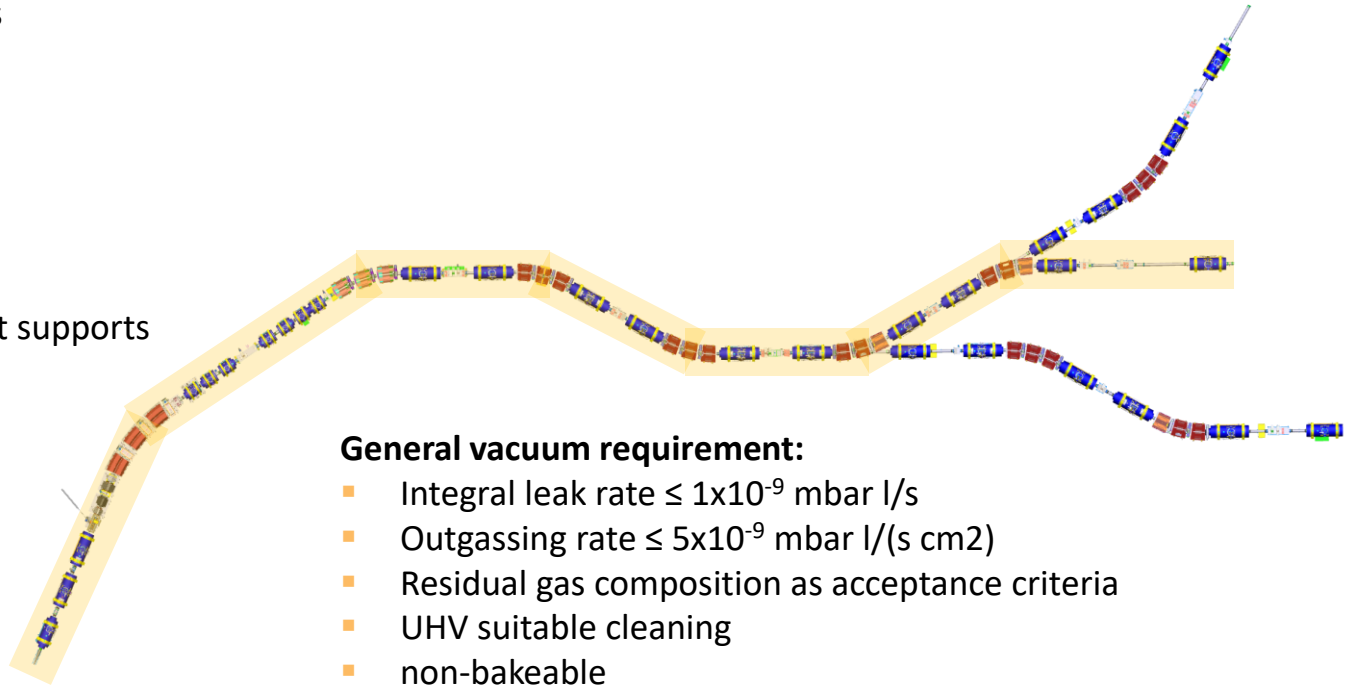
Super-FRS
beam line vaccum components

Sivaji Purushothaman
Work Package Leader
Super-FRS Special Vacuum components

Super-FRS beam line vacuum components

Super-FRS early science case components

- Focal plane vacuum chambers
- Dipole vacuum chambers
- Bellows
- Beam pipes
- Pumping chambers
- Adapter flanges
- Inflatable bellows
- Beam line vacuum component supports



General vacuum requirement:

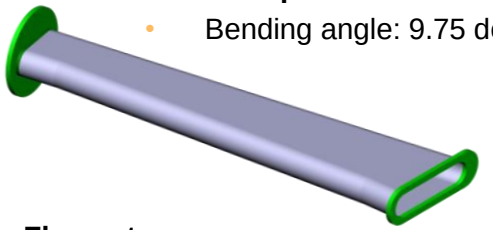
- Integral leak rate ≤ $1x10^{-9}$ mbar l/s
- Outgassing rate ≤ $5x10^{-9}$ mbar l/(s cm2)
- Residual gas composition as acceptance criteria
- UHV suitable cleaning
- non-bakeable

Super-FRS Vacuum component: time schedule

Component	Number of pieces	Tender closing	Ready for shipping to FAIR
Branching dipole chamber – Y shaped	3	15.09.2023	1Q 2025
SC dipole chamber - Series	11	15.11.2023	1Q 2024 To 1Q 2025
Focal plane chamber -Series	11	15.12.2023	2Q 2024 to 2Q 2025
Inflatable Bellows - Series	20	15.11.2023	2Q 2024 to 2Q 2025
Pumping chambers	9	15.04.2024	3Q 2024 to 4Q 2024
Bellows (DN400CF)	19	15.07.2024	3Q 2024 to 1Q 2025
Beam pipes , different lengths(DN400CF)	10	15.07.2024	4Q 2024 to 1Q 2025
Rectangular Bellows (680mm X 140 mm)	3	15.08.2024	1Q 2025
Support Frames – beam line elements	25	15.04.2024	3Q 2024 to 4Q 2024
Adapter flanges DN500-DN400	10	15.07.2024	4Q 2024

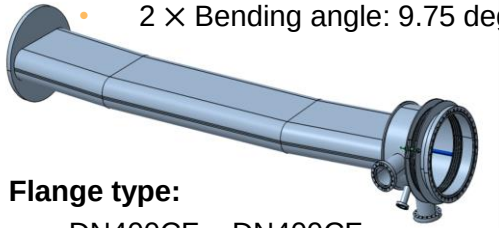
Dipole Vacuum chambers

3 × **V-shaped**
- Bending angle: 9.75 deg.



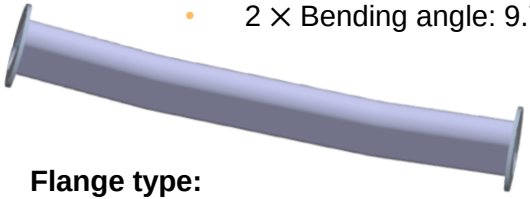
Flange type:
- DN400CF – race track (680 × 140 mm)

Curved
- 2 × Bending angle: 11 deg.
- 2 × Bending angle: 9.75 deg.



Flange type:
- DN400CF – DN400CF

Curved
- 2 × Bending angle: 11 deg.
- 2 × Bending angle: 9.75 deg.



Flange type:
- DN400CF – DN400CF

Number of dipole vacuum chambers: 13
- Weight: approximately 250-300 kg
- Additional items: Support structure for each chamber

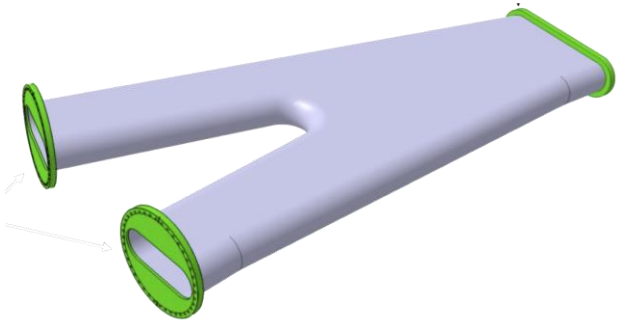
Dimensions:
- Minimum open aperture (narrow end): 380 mm X 140 mm
- Chamber length: ~3 m (9.75 deg)
- Chamber length: ~3.2 m (11 deg)
- Allowed maximum wall thickness: 11 mm
- recommended wall thickness: 8 mm

Critical material property
- **Required relative magnetic permeability: ≤1.01**

Recommended material:
- **316LN stainless steel or other non-magnetic alloy**

Tender closing	Ready for shipping to FAIR
15.12.2023	2Q 2024 to 2Q 2025

Dipole Vacuum chambers (branching)



3 × **Y-shaped**

- Bending angle: 9.75 deg.

Flange type:

- 2 × DN400CF - race track (680 × 140 mm)

Number of dipole vacuum chambers: 3

- Weight: approximately 200-250 kg
- Additional items: Support structure for each chamber

Dimensions:

- Minimum open aperture (narrow end): 380 mm X 140 mm
- Chamber length: ~3 m
- Allowed maximum wall thickness: 11 mm
- recommended wall thickness: 8 mm

Critical material property

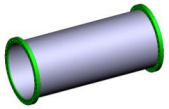
- **Required relative magnetic permeability: ≤1.01**

Recommended material:

- **316LN stainless steel or other non-magnetic alloy**

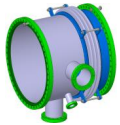
Tender closing	Ready for shipping to FAIR
15.09.2023	1Q 2025

Vacuum components without specified magnetic permeability requirements

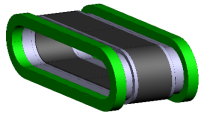


Beam pipes

Hydroformed bellows



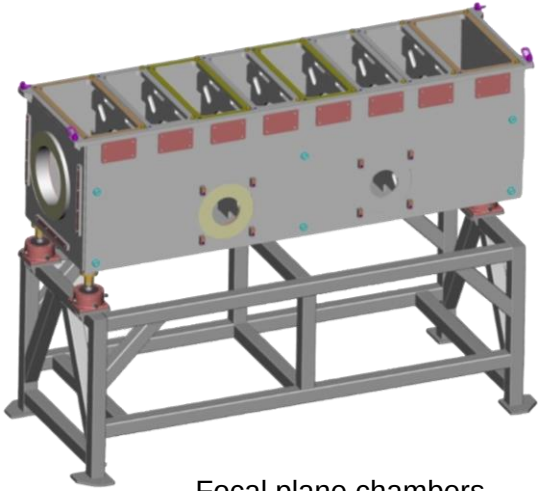
Pumping chambers with integrated bellows



Race track shaped edge welded bellows

Components	Material properties
• Chambers • Beam pipes	DIN EN 10088, without specified magnetic permeability such as 1.4301, 1.4306, 1.4307, 1.4404,1.4435 or 1.4429
• Flanges	ISO 3669. Material: DIN EN10088: stainless steel 1.4306 (or higher quality),
• Bellows	Stainless steel alloy 1.4541, 1.4571, 1.4404 or 1.4435

Quality requirements	
Vacuum side	DIN ISO 5817 quality class B, Surface quality Rz=25
Welder certification	DIN EN ISO 9712- Quantification and Certification of Non Destructive Testing



Focal plane chambers

Super FRS focal plane chambers

Number of Items: 11
Variants: 11

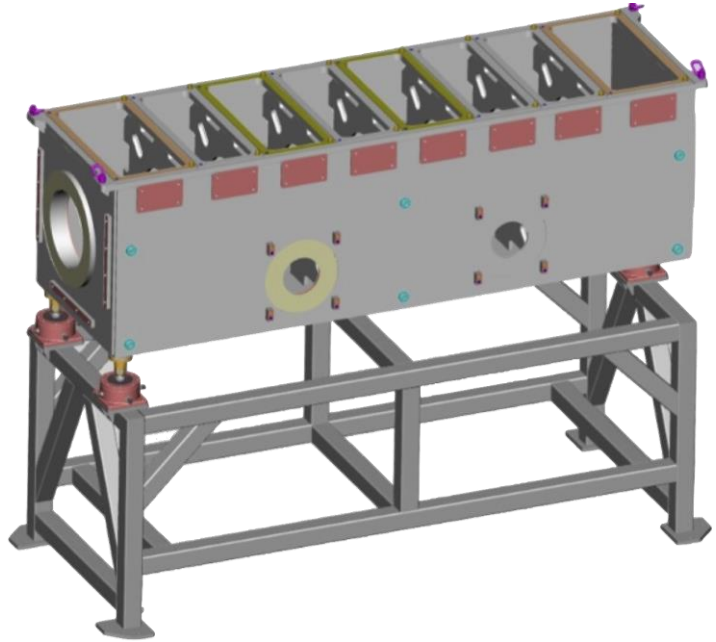
Additional items: Support frame for each chamber, Set of blind flanges

Material requirement:

- stainless steel of any type (without specified magnetic permeability) such as 1.4301, 1.4306, 1.4307, 1.4404,1.4435 or 1.4429. (must follow DIN EN 10088)

Task for the contractor: Design, Production

- **Critical mechanical property**
- **High requirements on overall flatness of the top plate** (0.1 mm)
- **Thick top plate required: approximately 40 mm**



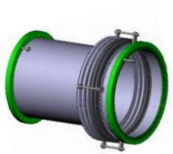
Tender closing	Ready for shipping to FAIR
15.12.2023	2Q 2024 to 2Q 2025

Super FRS focal plane chambers - Variants

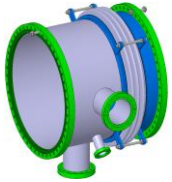
Nomen-clature	Maximum length× width× height	Evalu-ated weight, (without inserts)
	mm^3	Kg
FTF1DK1	1700×641×460	500
FPF2DK1	**3460**×960×1130	2800
FPF3DK1	1034×960×970	900
FPF4DK1	3280×960×970	2700
FMF1DK1	2440×960×970	2100
FMF3DK1	2434×960×970	2100
FMF2DK1	1040×960×970	1000
FMF2DK2	2276×960×1130	2000
FMF2DK3	1000×960×970	900
FHF1DK1	1514×960×970	1200
FHF1DK2	2794×960×970	2100

Prototype
FPF4DK1

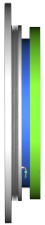
Beam vacuum elements



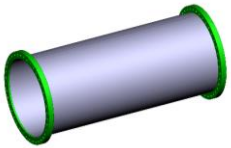
Hydroformed bellows
One fixed and other rotatable
DN400CF flanges



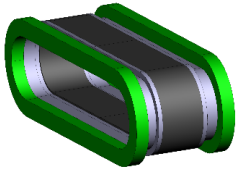
Pumping chambers: DN400 pipes with
One fixed and other rotatable DN400CF flanges
Hydroformed bellows
2 × DN150CF ports
1 × DN40CF port



Inflatable bellows
One DN500 ISO-F type and other DN400CF flanges



Beam pipes:
DN400 pipe
One fixed and other rotatable
DN400CF flanges



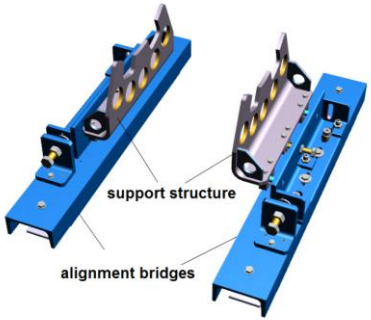
Race track bellows
Edge-welded type
680mm X 140 mm
Helicoflex type flanges

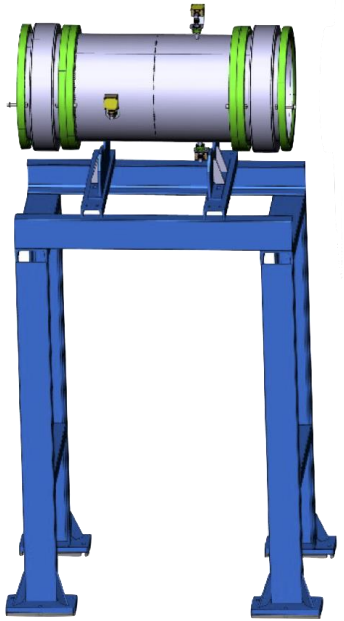
Component	Number of pieces	Tender closing	Ready for shipping to FAIR
Inflatable Bellows - Series	20	15.11.2023	2Q 2024 to 2Q 2025
Pumping chambers	9	15.04.2024	3Q 2024 to 4Q 2024
Bellows	19	15.07.2024	3Q 2024 to 1Q 2025
Beam pipes , different lengths	10	15.07.2024	4Q 2024 to 1Q 2025
Rectangular Bellows	3	15.08.2024	1Q 2025
Adapter flanges DN500-DN400	10	15.07.2024	4Q 2024

Support Frames for beam line elements

Number of supports (of various types): 25

- Constructional steel grade: (DIN) EN 10025-2
- Design: Hollow sections accordance with (DIN) EN 10210-2 and (DIN) EN 10219-2.





Tender closing	Ready for shipping to FAIR
15.04.2024	3Q 2024 to 4Q 2024

FAIR tender process (TED)

- >220.000 EUR

- **Round Vacuum Chambers for HEBT Quadrupole and Steerer Magnets**
  https://ted.europa.eu/udl?uri=TED:NOTICE:211068-2023:TEXT:EN:HTML

- **Y-shaped vacuum chamber for the branching dipole of super-FRS**
- https://www.dtvp.de/Satellite/public/company/project/CXS0YYEYWW63LSEQ/de/documents

ted.europa.eu/udl?uri=TED:NOTICE:211068-2023:TEXT:EN:HTML

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Original language | Data

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I. II. III. IV. VI.

Germany–Darmstadt: Particle accelerators

2023/S 070–211068

Contract notice

Supplies

Legal Basis:
Directive 2014/24/EU

Section I: Contracting authority

I.1) **Name and addresses**
Official name: FAIR – Facility for Antiproton and Ion Research in Europe GmbH
Postal address: Planckstr. 1
Town: Darmstadt
NUTS code: DE711 Darmstadt, Kreisfreie Stadt
Postal code: 64291
Country: Germany
E-mail: proekf32@gsi.de
Telephone: +49 6159/71-1988
Fax: +49 6159/71-3983
Internet address(es):
Main address: http://www.fair-center.de

I.3) **Communication**
The procurement documents are available for unrestricted and full direct access, free of charge, at:
https://www.dtvp.de/Satellite/notice/CXS0YYEYWTK9W4CP/documents
Additional information can be obtained from the abovementioned address
Tenders or requests to participate must be submitted electronically via:
https://satellite.dtvp.de/Satellite/notice/CXS0YYEYWTK9W4CP

I.4) **Type of the contracting authority**
Other type: Large-scale research institute

participation in the procedure

PARTICIPATE

Without confirmation of participation in this procedure, there will be **no e-mail notification** of new messages from the awarding authority (e.g. update of the award documents).

Confirm your participation in the procedure to be able to use the following advantages:

1. You will be informed automatically by e-mail about new messages from the awarding authority (e.g. changes to the award documents).
2. You can send your own messages directly to the registration office via the communication area.
3. You can electr. Submit offers/applications to participate, provided this option has been approved by the awarding authority.

Participate now | Register

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Write to

filename	Added on	Type	Size	action
FAIR_Special_Application_Requirements_public.pdf	07.04.2023		232.6KB	

service descriptions

filename	Added on	Type	Size	action
Drawings_AP1_round_mag_chambers_final.zip	07.04.2023		10.1MB	
F-DS-HEB-en-VC_0088_Detailed_Specification_Round_Magnet_Chambers-V005.pdf	07.04.2023		1.2MB	
Overviewlist_AP1_round_mag_chambers_final.xlsx	07.04.2023		18.1KB	
Sub_Documents.zip	07.04.2023		9.9MB	

Documents to be completed by the company

filename	Added on	Type	Size	action
FAIR participation_request and suitability.docx	07.04.2023		316.9KB	
FAIR_Intention-to-participate.docx	07.04.2023		290.2KB	
FAIR_Offer-Form_Terms.docx	07.04.2023		298.2KB	

Terms of Contract

filename	Added on	Type	Size	action
FAIR_General_Terms_and_Conditions_of_Purchase.pdf	07.04.2023		42KB	
VOL_B_English.pdf	07.04.2023		177.3KB	

Miscellaneous

filename	Added on	Type	Size	action
FAIR_Information eTender.docx	07.04.2023		305.9KB	

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Contact information regarding tehcnical information

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