Bilfinger Noell GmbH

Magnet Technology @ Bilfinger Noell GmbH

Superconducting IDs as Commercial Product

M. Gehring for the SCU Team – Bilfinger Noell GmbH

Outline

Bilfinger Noell

SCU15 and SCU20

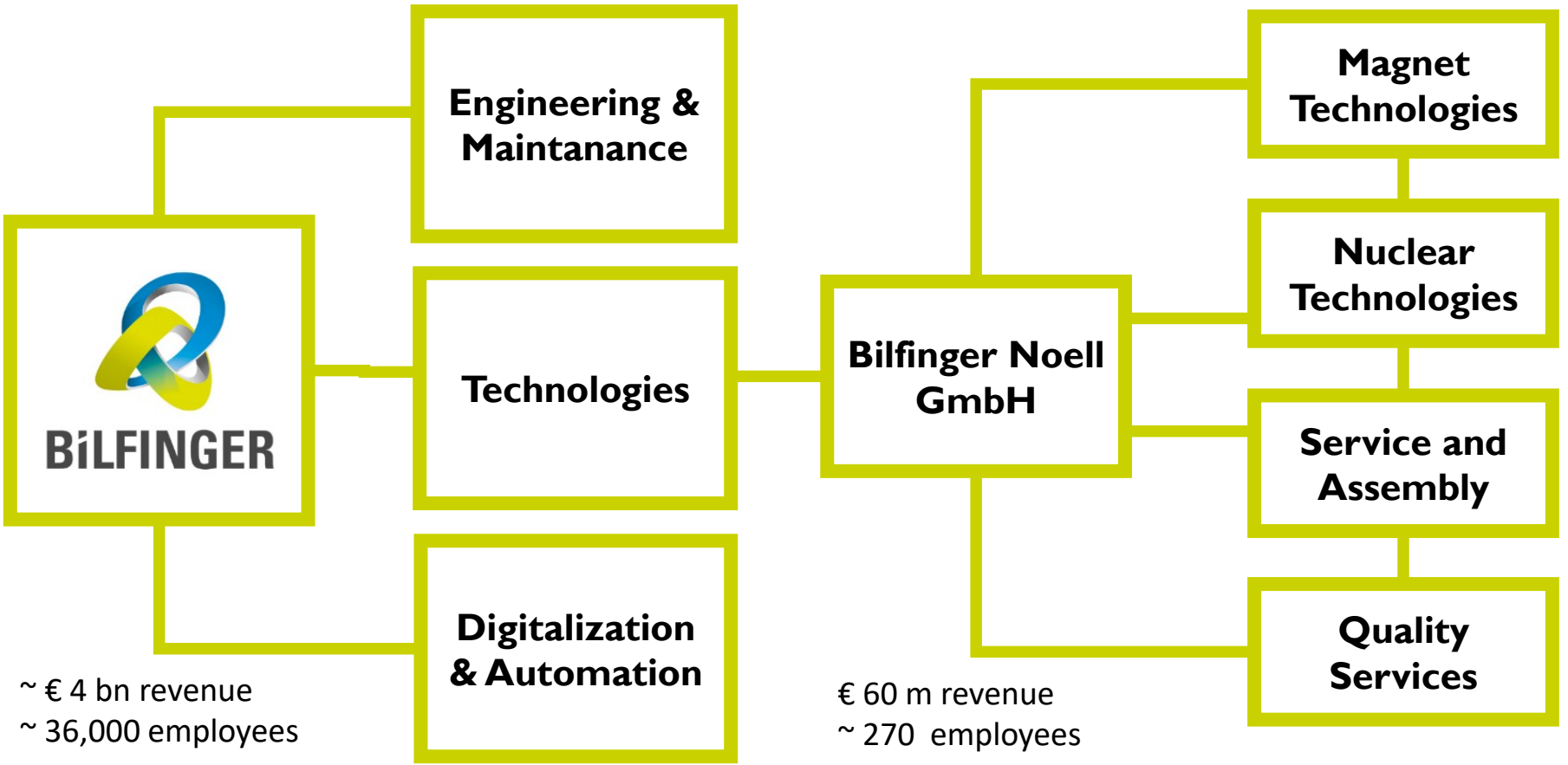
SCU20 in operation

New devices

Summary

NOELL within Bilfinger

Synergy and stability



BILFINGER NOELL GMBH

NOELL CORE COMPETENCES

Engineering

Multi-physics approach towards complex engineering tasks for custom design solutions

Vacuum technology

Extensive experience in the design and manufacture of complex UHV components and vacuum vessels

Cryogenics

Highly efficient design of both helium and conduction-cooled systems down to 2 K

Series production

Optimization of complex manufacturing processes from small-scale to series production

Testing capabilities

Trained personnel and specialized equipment for cryogenic and vacuum testing in-house

Magnet technology

Wide range of experience in superconducting (LTS and HTS) as well as resistive and permanent magnets

Specialized hardware

Special tooling and equipment including winding and cabling machines and furnaces for impregnation

Passion for PRODUCTS

A diverse market spectrum

ENERGY

Superconducting flywheel energy storage

ACCELERATOR

Conduction-cooled superconducting undulators

SCIENCE

PINE mobile cloud chamber

MAGNETS

Conduction-cooled superconducting solenoids

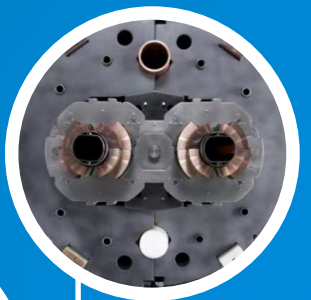
SERIES production at NOELL

A history of performance

STAGE COACH

DESY HERA

MPI W7-X

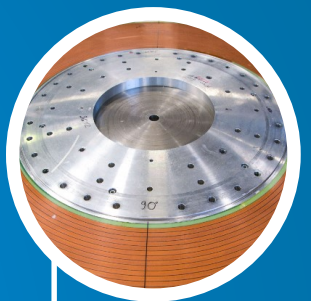


CERN LHC

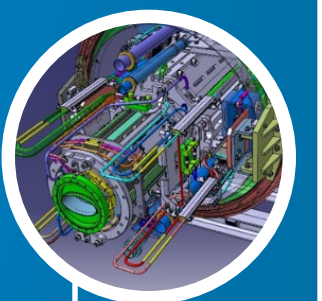
DESY PETRA

GSI SIS100

DESY FLASH



CNRS LNCMI



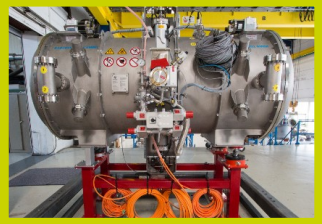
GSI QDM

1824 '50 1986 '98 '99 2008 '11 '12 '16 '18

CUSTOM solutions

Experience in innovation

FLYWHEEL



KIT - SCU20

CERN - ALPHA

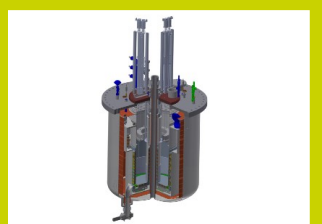
KIT - VATESTA

BILFINGER

TUM - PERC

FZJ - NSE

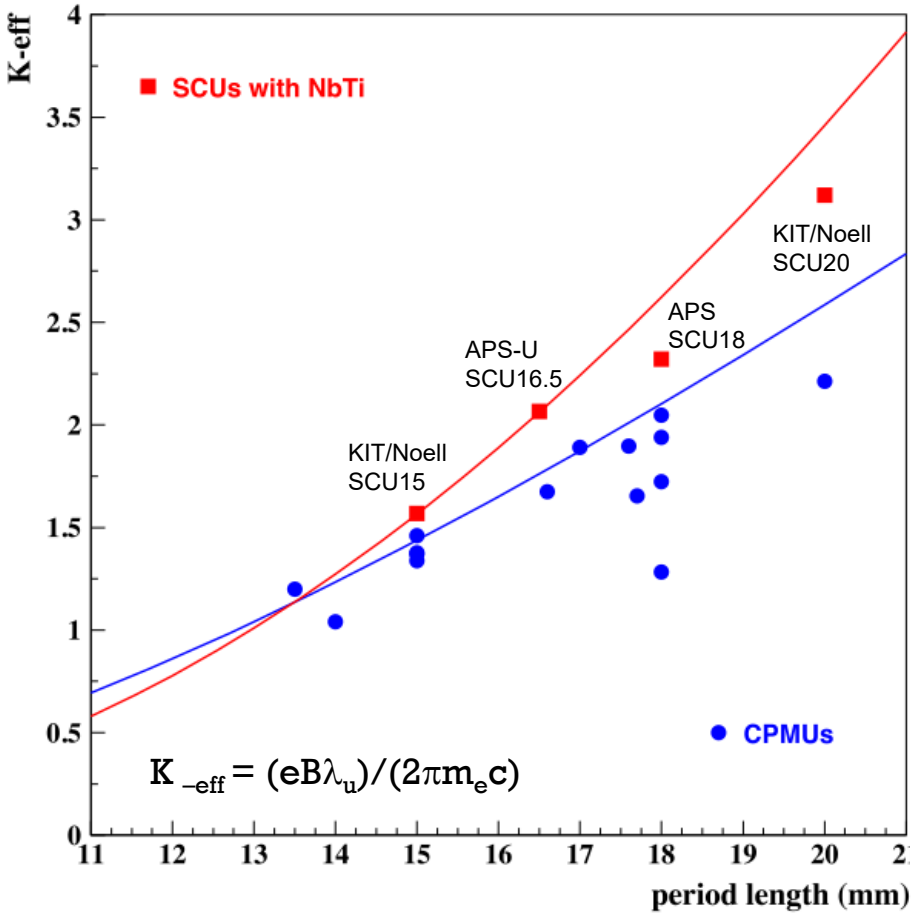
SNS - NSE



TUM - PENELOPE

Performance of SCUs

A Proven Advantage



Higher peak field on axis for the same gap and period length in operation with electron beam.

Demonstrated higher radiation resistance compared to permanent magnet undulators.

Full potential of superconductivity not yet exploited, margins on NbTi and increased potential of Nb_3Sn and HTS.

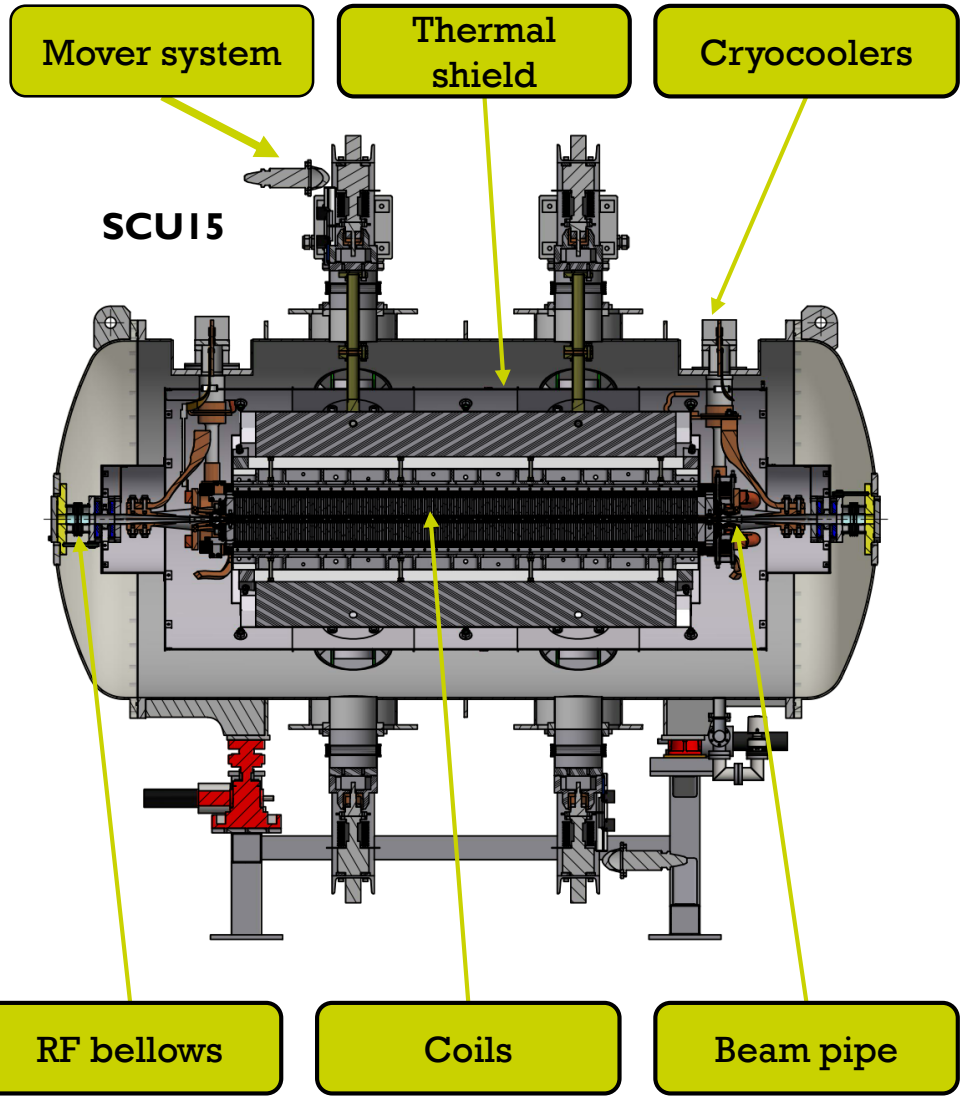
Facility	Start-finish of operations	λ_0 (mm)	# of periods	Vacuum aperture (mm)	Gap loss (mm)	B (T)
APS 2 SCUs	2015–current 2016–current	18	59.5	7.2	2.3	0.97
APS	2013–2016	16	20.5	7.2	2.3	0.8
APS Helical	2017–current	31.5	38.5	26	5	0.45
APS-Upgrade	Planned – one example	16.5	216	6	2	1.07
KIT/Accel	2005–2012	14	100	8,12,16,25 (open)	0.6 (?) (design)	0.3
KIT/Noell	2014–2015	15	100.5	7,16 (open)	1	0.73
KIT/Noell	2017–current	20	74.5	7,15 (open)	1	1.18

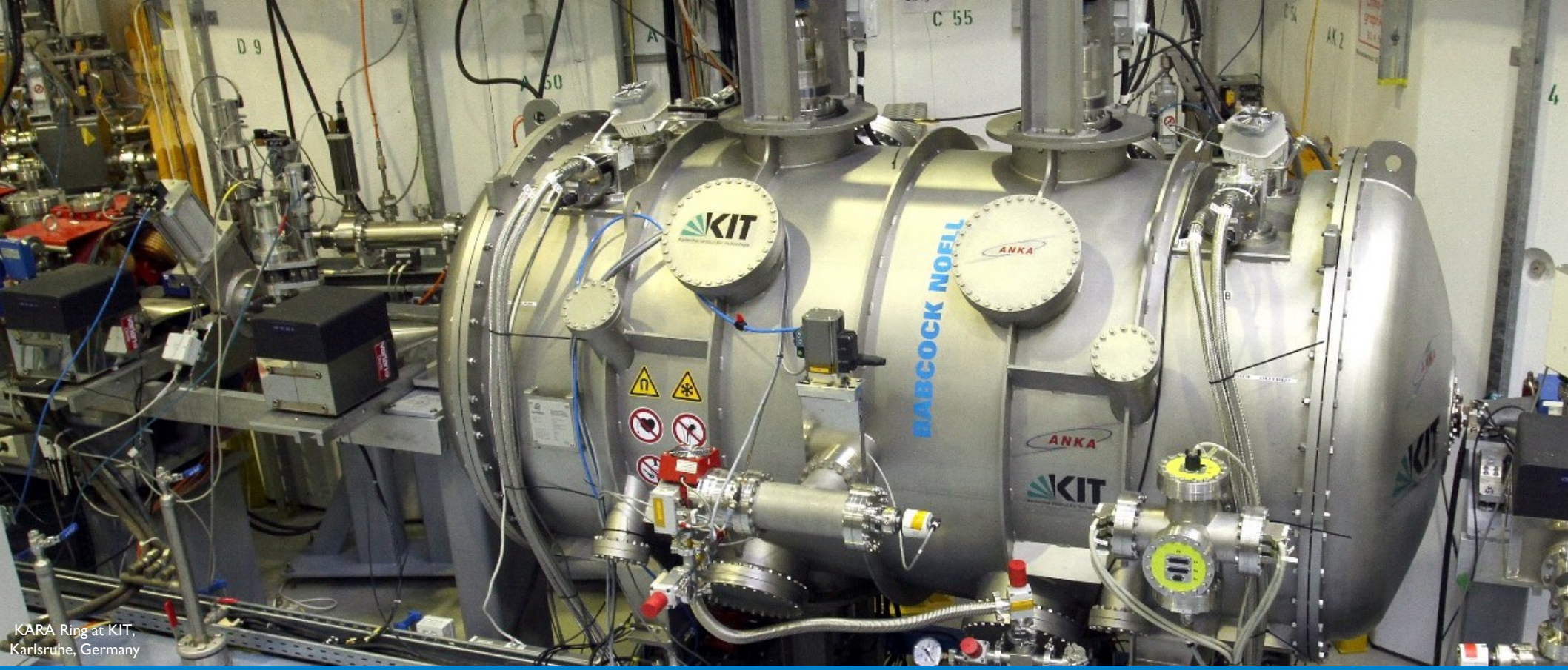
Bahrdt – Gluskin NIMA 2018

SCU15 and SCU20

Main Parameters

	SCU15	SCU20	Units
Period length	15	20	mm
Full periods	100.5	74.5	#
Max field on axis 7 mm gap	0.73	1.19	T
Nominal current	150	395	A
Ramp to nominal current	450	300	s
Operating vacuum gap	7	7	mm
Injection vacuum gap	15	15	mm
Beam heat load	4	4	W
Design temperature	4.2	4.2	K





KARA Ring at KIT,
Karlsruhe, Germany

SCU15

KARA Ring at KIT,
Karlsruhe, Germany

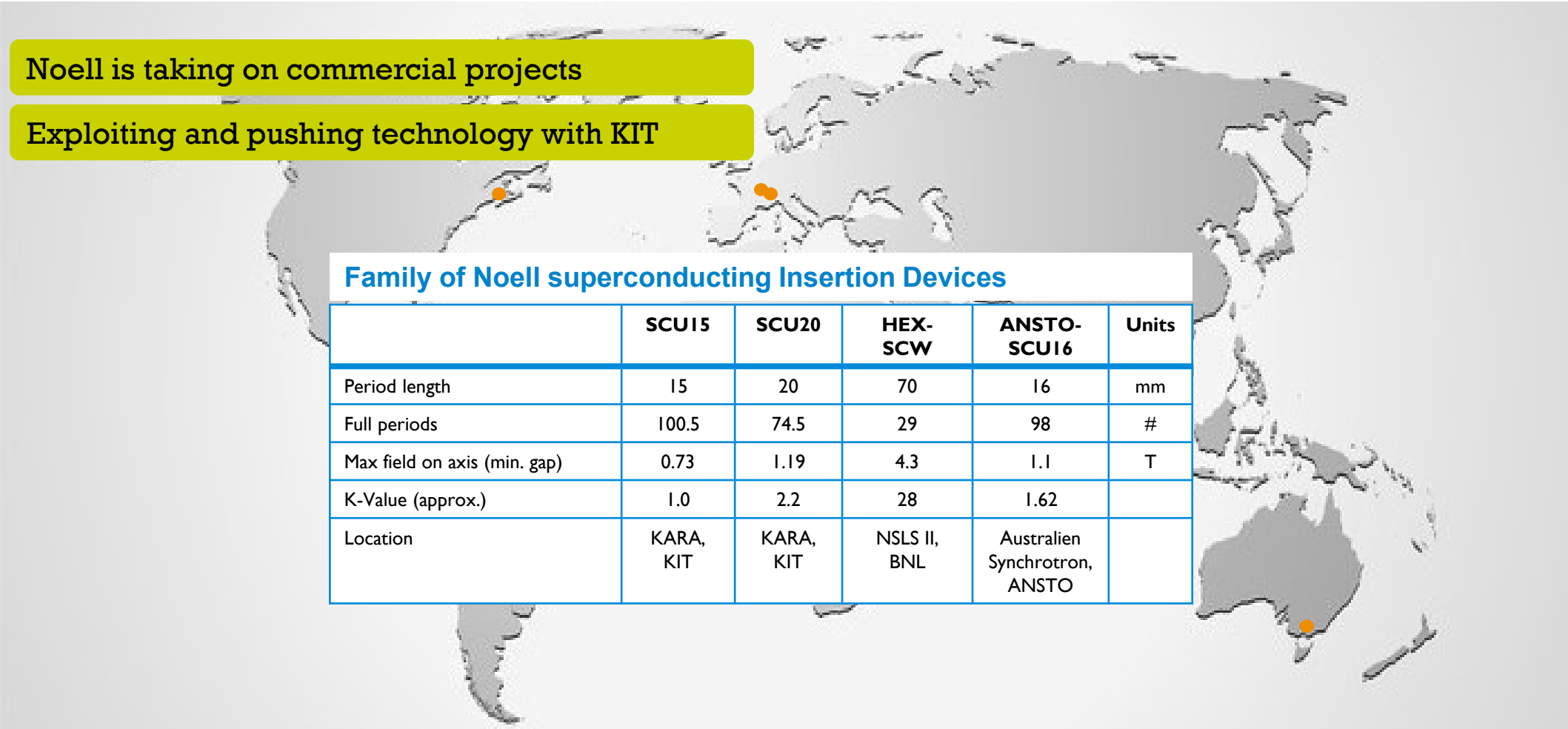
SCU20

New Devices

Worldwide activity of Noell on ScIDs

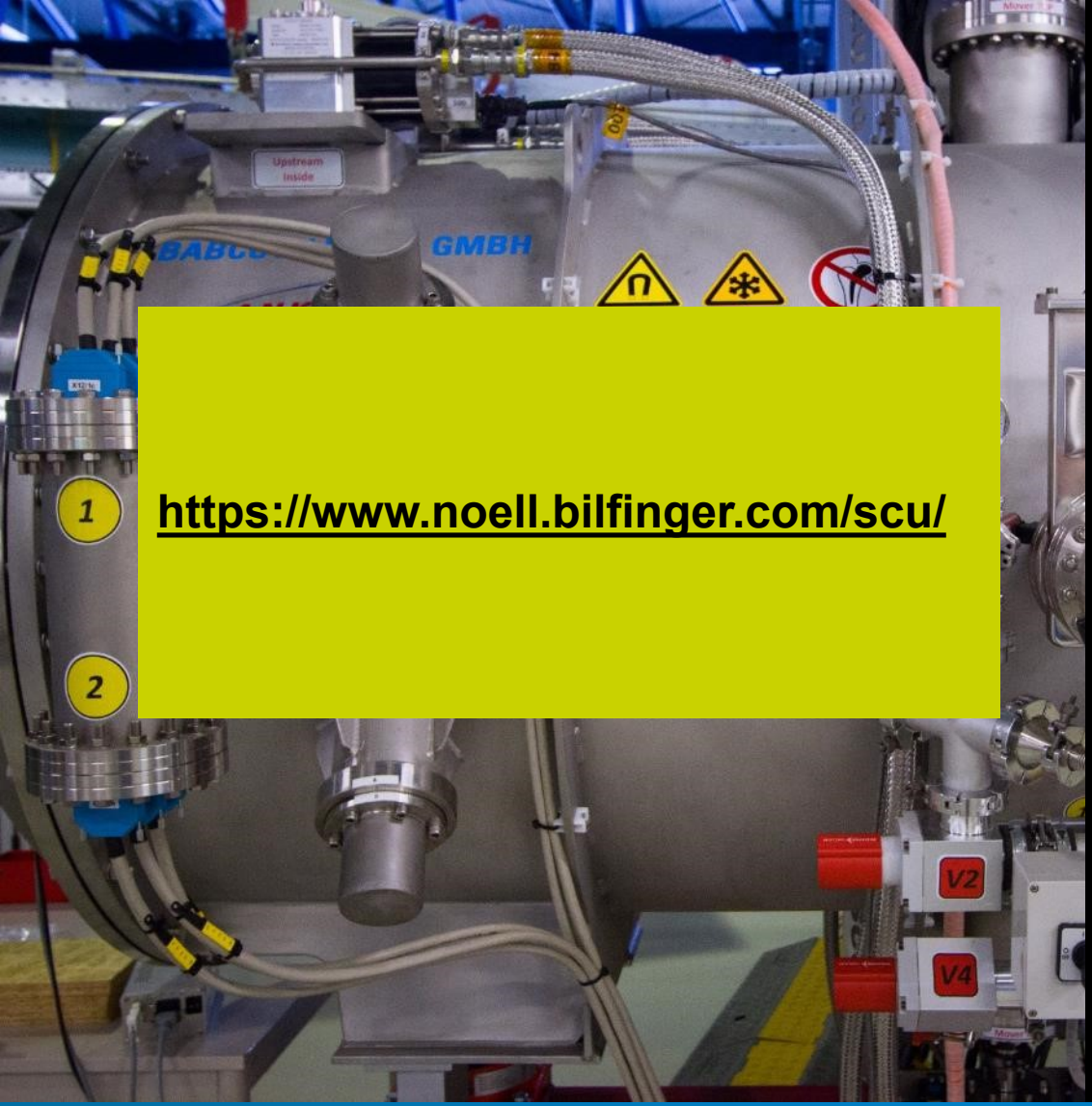
Noell is taking on commercial projects

Exploiting and pushing technology with KIT



Family of Noell superconducting Insertion Devices

	SCU15	SCU20	HEX-SCW	ANSTO-SCU16	Units
Period length	15	20	70	16	mm
Full periods	100.5	74.5	29	98	#
Max field on axis (min. gap)	0.73	1.19	4.3	1.1	T
K-Value (approx.)	1.0	2.2	28	1.62	
Location	KARA, KIT	KARA, KIT	NSLS II, BNL	Australien Synchrotron, ANSTO	



Summary

RELIABLE

SCU15 and SCU20 demonstrated long term operation in the KIT ring. SCU20 serves as source for user beamline

BRILLIANT

In terms of peak field, both SCU15 and SCU20 outperform devices with competing technologies

PLUG´n PLAY

No liquid helium required

OUTSTANDING UHV

No impact of the cold bore on beam operation

COMMERCIALLY AVAILABLE

KIT and Noell can tailor each device to customer needs

Contact

Bilfinger Noell GmbH
Alfred-Nobel-Str. 20
97080 Würzburg
Germany

Phone +49 931 903-6042
Fax +49 931 903-6010
noell.info@bilfinger.com
www.noell.bilfinger.com

Registered at Local Court Würzburg, HRB 7156
VAT-Id. No.: DE211420259

Executive Management:
Roland Pechtl