WP4 Summary

- Main linac module has a baseline design, under refinement in particular for 2-bunch operation. Integration under way.
- Sub-harmonic deflector system is well understood and baseline design is being established.
- Harmonic linearizer. 36 GHz chosen as baseline. All key elements are well understood. Some down-selection needs to take place to establish baseline. With WP3. Need voltage!
- WP4 members also are designing the C-band injector rf systems. With WP3.

S, C, X, Ka - 4 frequencies!

WP4 Summary

- Detailed mechanical and thermal analysis coupled with an industrialization study of the main accelerating structure is underway.
- Work on both final deliverables started. Template in overleaf with existing material being added.
- General – steady progress on high-frequency rf power source development, design flexibility improving steadily. Clear impact of CompactLight, especially in 1 KHz operation.

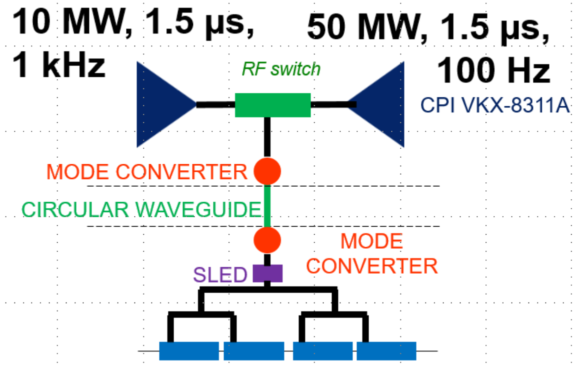
WP4 Summary

The linac module baseline

Funded by the European Union

Compact

X-BAND MODULE



Module (linear t No. 2)		
Frequency [GHz]	11.994	
RF pulse [µs]	1.5	
Average iris radius <a> [mm]	3.5	
Iris radius a [mm]	4.3-2.7	
Iris thickness t [mm]	2.0-2.24	
Structure length L_s [m]	0.9	
Unloaded SLED Q-factor Q_0	180000	
External SLED Q-factor Q_E	23200	
Shunt impedance R [MΩ/m]	90-125	
Effective shunt Imp. R_s [MΩ/m]	378	
Group velocity v_g/c [%]	4.7-0.9	
Filling time [ns]	146	
Repetition rate [Hz]	100	1000
Net kly. power (w/ loss) [MW]	40	8
Avg. acc. gradient [MV/m]	65	30

9

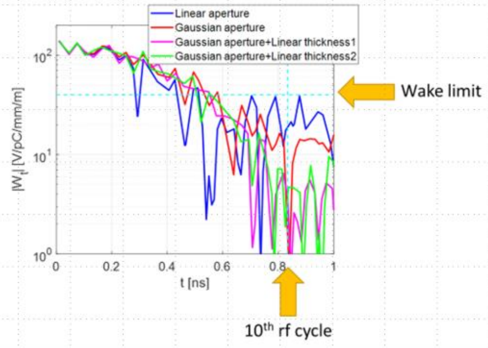
M. Diomede

Funded by the European Union

Compact

COMPARISON BETWEEN TAPERINGS

The wake around the 10th rf cycle was reduced by applying Gaussian distribution aperture and linear iris thickness



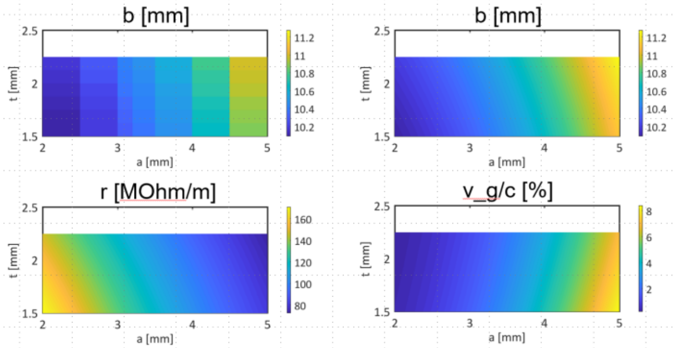
X. Wu

Funded by the European Union

Compact

CELL PARAMETERS

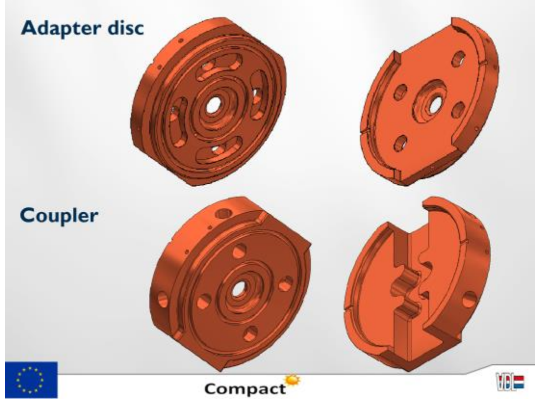
- As a function of iris radius a and iris thickness t

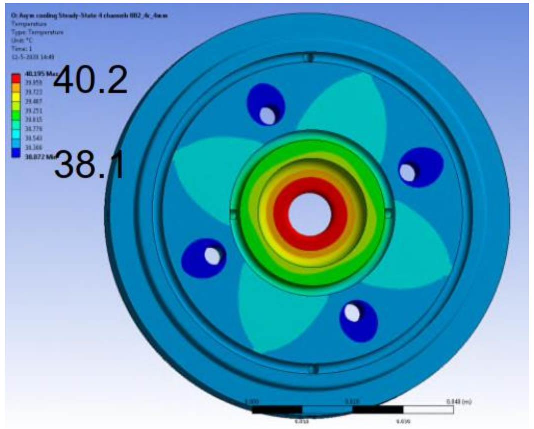


5

Multi-bunch studies

M. van den Berg





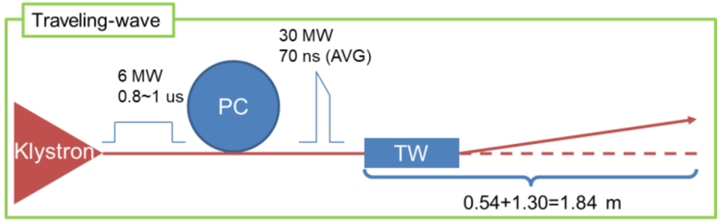
Thermo-mechanical design underway.

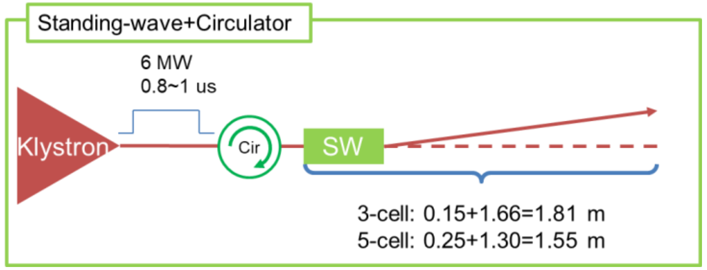
Funded by the European Union

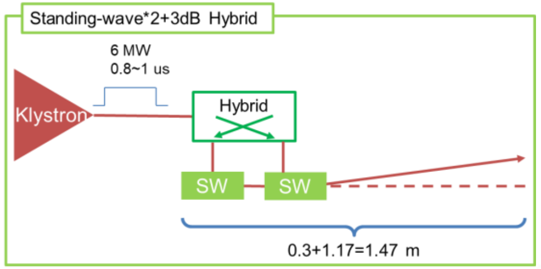
WP4 Summary

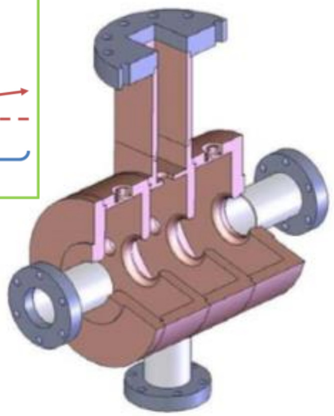
Compact

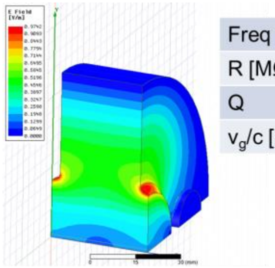
Deflector ready for down-selection to define baseline





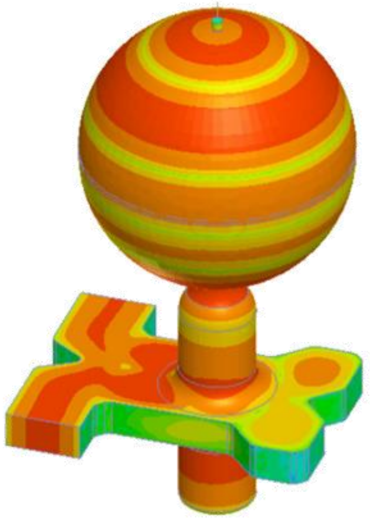


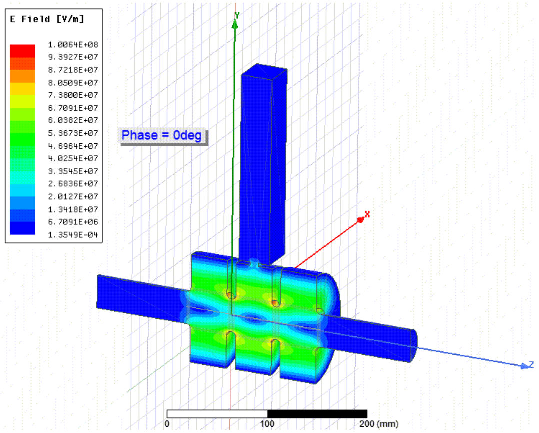




Freq [GHz]	2.998
R [MΩ/m]	20
Q	12000
v_g/c [%]	3

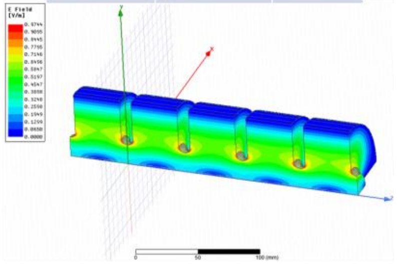
Drift length [m]	Deflecting voltage [MV]	Traveling wave (2π/3)		
		Input power [MW]	Stru. Length w/ PC [m]	Stru. Length w/o PC [m]
0.5	13.75	6	1.45	3.65
1.0	6.875	6	0.70	1.64
1.5	4.583	6	0.46	1.06
2.0	3.438	6	0.35	0.79





5-cell structure

R [MΩ]	Freq [MHz]	Q
5.02	2996	15271



WP4 Summary

ScandiNova

K-SERIES **K500**

RF PEAK POWER UP TO 100 MW
MODULATOR PEAK POWER UP TO 220 MW

This high-end solid-state pulse modulator is designed to handle a wide range of the largest klystrons on the market with a RF peak power from 50 MW to 100 MW. ScandiNova offers everything from a standard modulator to a turn-key RF system that includes all necessary system components from the wall socket to the accelerator, such as the klystron, diagnostics and low-level RF. Review our other pulse modulators in the modular K-Series.

EXCELLENCE IN PULSED POWER
www.scandinovasystems.com

M. Jacewicz

SYSTEM SPECIFICATIONS	UNIT	DATA	NOTES
Klystron RF Peak Power	MW	50–100	Depends on choice of klystron
Klystron RF Average Power	kW	60	Maximum
Modulator Peak Power	MW	220	Maximum
Modulator Average Power	kW	160	Maximum
Pulse Voltage	kV	320–500	Typical range
Pulse Current	A	300–525	Typical range
Pulse Repetition Frequency Range	Hz	0–500	Typical range. Depending on max average power (see options).
Pulse Length, Top	μs	0.5–15	Typical range. Depending on max mod. power.
Flatness (Voltage)	%/μs	< 0.5	Flat top. Depending on load (see options).
Modulator Voltage Stability, RMS	%	0.01	(see options)
Cooling (incl. RF parts)	l/min	20-300	Clean water

INTERFACE	DEFAULT	OPTION
Mains Power, 3 Phase	400 VAC, 50/60 Hz	208/380/480 VAC
Mains Power, Single Phase	230 VAC, 50/60 Hz	115 VAC
Control Interface	ModBus TCP	
Water Cooling Interface In/Out	ISO G2"	
Trig Input	Electrical and Optical	
Diagnostics	Pulse Voltage and Current	See Options

Standard Modulator Includes

Control System (ScandiCat)
Remote Control
Local Control Panel
Mains Power Distribution
Cooling System
Filament PS
Klystron Socket
Pulse Sensors
Hard Wired Interlock System

Additional System Components

Low Level RF Amplifier/Generator
Circulator & RF Loads
Directional Coupler
Waveguide Windows
Vacuum PS
Solenoid PS
Klystron
Extended cooling for Klystron, solenoid etc.

Typical Klystron Loads

Thales
TH1801
TH2104C
TH2104[illegible]
TH2104U
TH2108-1
TV2022B
TV2022C
TV2022D

Toshiba
E3712 ([illegible] MW)
E3712 (80 MW)
E3740A
E3766

CPI
VKP-7952C
VKS-8262N

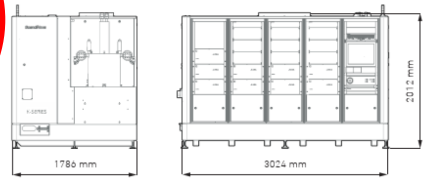
Options

Pulse/RF Diagnostics
Enhanced PRF Range (up to 1000 Hz)
Enhanced Stability (down to 0.002%)
Enhanced Flatness (<0.25 %/μs)
Neutron Resistant Switching

Size and Weight

Weight approx. 3300 kg
([illegible] oil, klystron, solenoid)
Oil volume approx. 1100 l

Information contained in this document



HEADQUARTERS
ScandiNova Systems AB
Ultunaallén 2A
SE-756 51 Uppsala, Sweden

CONTACT
Tel: +46 (0)18 480 59 00
E-mail: info@scandinovasystems.com
www.scandinovasystems.com

ScandiNova
EXCELLENCE IN PULSED POWER

Options

Pulse/RF Diagnostics

Enhanced PRF Range (up to 1000 Hz)

Enhanced Stability (down to 0.002%)

Enhanced Flatness (<0.25 %/μs)

Neutron Resistant Switching

Funded by the
European Union

WP4 Summary

Growing choice of X-band and high repetition-rate klystrons. Highly important mutual reinforcement of development for applications and technology.

CPI

- Progress on Manufacturing of 6 MW Klystrons X-band
- Design of 10 MW Klystron X-band
- Optimization of the 20 MW Klystron Design using GSB/Dakota X-band
- Magic 2D Simulation of CERN High Efficiency 50 MWX-band
- Preliminary Design of the 15 MW, 5.996 GHz Klystron C-band

Canon

- 8-10 MW high-efficiency version of existing 6 MW under design X-band
- 20 MW version under design X-band

M. Jacewicz

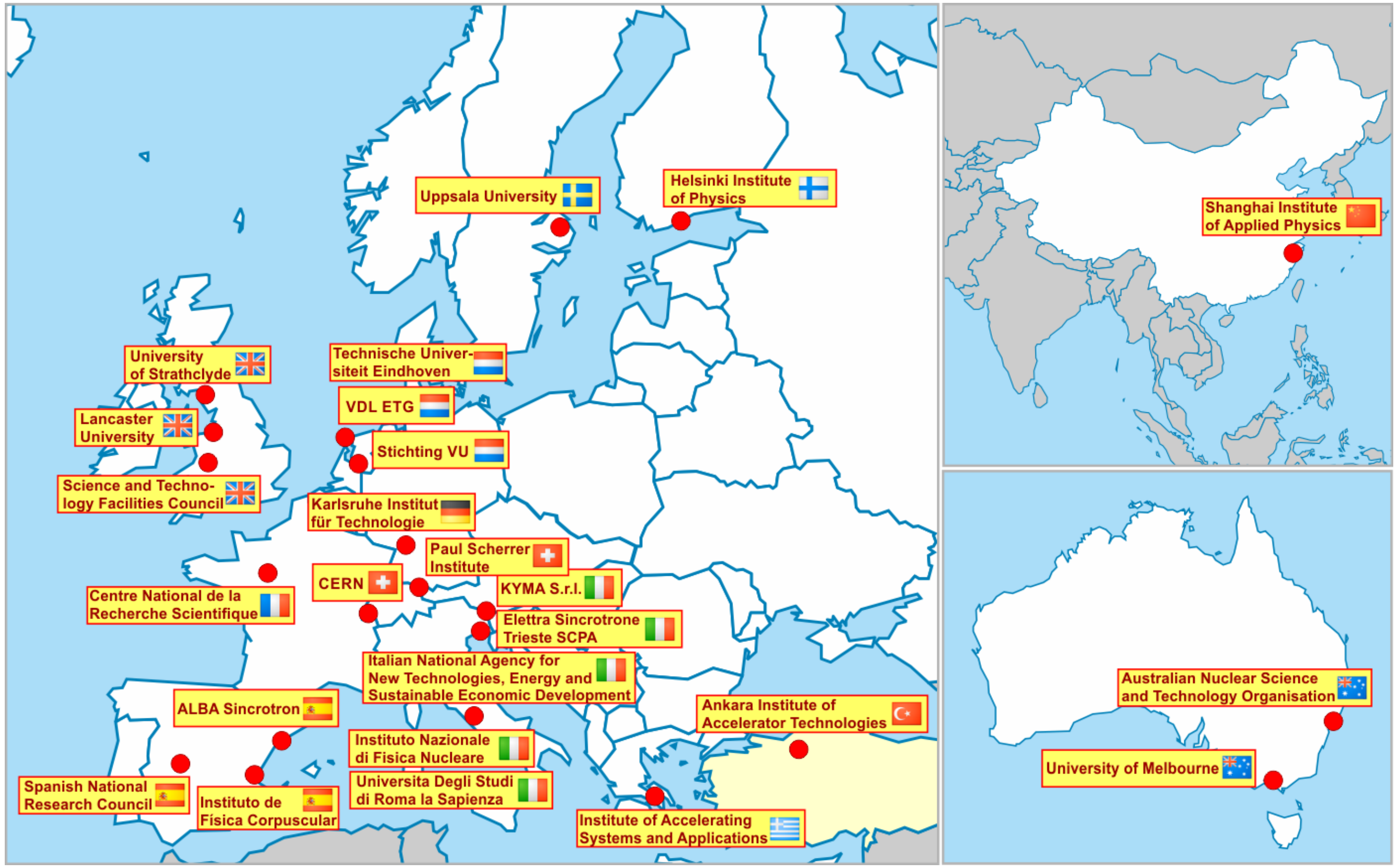
Funded by the European Union

Thank you!

Compact

CompactLight@elettra.eu

www.CompactLight.eu



CompactLight is funded by the European Union's Horizon2020 research and innovation programme under Grant Agreement No. 777431.