



## INDux Training Course Basic Level Modules 1 and 2

### GENERAL INFORMATION ON TRAINING COURSE

<b>GOALS</b>	- Familiarization with the Rhodotron® and its main subsystems and improvement of the level of autonomy in its use. - Familiarization with the RF and cooling systems.
<b>LOCATION</b>	INDux center - Belgium
<b>PROGRAM</b>	See table below
<b>DURATION</b>	5 full days for each module
<b>ATTENDANCE</b>	5 -8 persons
<b>TRAINEE'S PRE-REQUIREMENT</b>	The trainees should be fluent in English, having an adequate degree of experience and technical expertise corresponding to the responsibilities involved.

Certificate of participation will be issued to the trainees at the end of the training week.

#### BASIC 1

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
<b>RHODOTRON DISCOVERY</b>	<b>VACUUM SYSTEM</b>	<b>E-SOURCE CATHODE REPLACEMENT</b>	<b>POWER SUPPLIES BASIC</b>	<b>CATHODE REGENERATION</b>
<ul style="list-style-type: none"> <li>- The journey of electrons.</li> <li>- Subsystems &amp; components identification.</li> <li>- Mechanical tools usage, materials identification, and vacuum seals.</li> </ul>	<ul style="list-style-type: none"> <li>- Theory of vacuum, working principles, units and ranges.</li> <li>- Practical exercises : pumps replacement, leak detection, vacuum controller (TPG).</li> </ul>	<ul style="list-style-type: none"> <li>- E-source subsystem components description.</li> <li>- First introduction to the Rhodotron HMI (human machine interface) and to the use of an oscilloscope.</li> <li>- E-beam and X-ray theory.</li> </ul>	<ul style="list-style-type: none"> <li>- Identification of the main devices composing a power supply.</li> <li>- Discussion about the typical failures of these devices.</li> <li>- Cables identification and connector assembly.</li> </ul>	<ul style="list-style-type: none"> <li>- E-source high voltage conditioning, reactivation. tasks on product validation.</li> <li>- E-source socket dismantling.</li> <li>- E-source beam tuning (simulator).</li> </ul>

#### BASIC 2

MONDAY & TUESDAY	WEDNESDAY & THURSDAY	FRIDAY
<b>INTRODUCTION TO THE RADIO FREQUENCY WORLD AND DEIONIZED WATER</b>	<b>BEAM CURRENT MONITORING, RF CHAIN REGULATION (LOW-LEVEL RF RACK) AND FINAL POWER AMPLIFIER DISCOVERY (FPA)</b>	<b>DRIVER AMPLIFIER, DOCUMENTATION &amp; TRAINING MODULE SUMMARY.</b>
<ul style="list-style-type: none"> <li>- Transmission line, impedance matching, standing wave and network analyzer usage.</li> <li>- Introduction to the Rhodotron RF chain, practical exercises on each amplifier in the chain (Pre-Driver, Driver and tetrode RF tube)</li> <li>- Testing the impact of the deionized water , replacement of the deionization bottle.</li> <li>- Preventive maintenance – general tasks.</li> </ul>	<ul style="list-style-type: none"> <li>- DCCT working principle &amp; calibrations.</li> <li>- Introduction to the LLRF parameters and its regulation loops (voltage and frequency)</li> <li>- Dismantling of Final Power Amplifier, Kapton sheets replacement and High voltage tests.</li> </ul>	<ul style="list-style-type: none"> <li>- Driver tetrode replacement and Driver input tuning.</li> <li>- Wiring list and Build of Material (BOM) usage. Troubleshooting introduction.</li> <li>- Recap of Basic Modules 1 &amp; 2</li> </ul>