

# ARDENT implementation and execution

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# Links of research projects to WPs

ESR number	Individual Research project (title)	Link with WPs	Host Institution	Fellow months
ESR 1	Development of compact neutron spectrometer	1, 2, 4, 5, 6	CERN	36
ESR 2	Dosimetry in mixed fields with Medipix and RP training	2, 4, 5, 6	CERN	36
ESR 3	Dosimetry in mixed fields with GEM and TEPC	1, 4, 5, 6	CERN	36
ESR 4	Medical applications of Si detectors	2, 4, 5, 6	CERN	36
ESR 5	Characterisation of TEPC for space and medical applications	1, 4, 5, 6	AIT	36
ESR 6	Development of nano dosimeter	1, 4, 5, 6	AIT	36
ESR 7	Development of radiation-hard radiation field monitor	2, 4, 5, 6	CTU	36
ESR 8	Development of Medipix-based educational tool	2, 4, 5, 6	CTU	36
ESR 9	Optimization of mixed-field data evaluation	2, 4, 5, 6	CTU	36
ESR 10	Development of detector system for medical Quality Assurance	2, 4, 5, 6	IBA	36
ESR 11	Mixed field dose determination with pixel detectors	2, 4, 5, 6	IBA	36
ESR 12	Development of Medipix-based radiation monitoring system	2, 4, 5, 6	Jablotron	36
ESR 13	Neutron dosimetry and spectrometry with CR-39	3, 4, 5, 6	MI.AM	36
ESR 14	Solid state microdosimetry	2, 4, 5, 6	POLIMI	36
ESR 15	CR-39 and active detector for pulsed neutron fields	1, 3, 4, 5, 6	POLIMI	36



# Secondments (CERN)

ESR	Thesis/topic	Individual training	Secondments (expected duration in months)
ESR 1 (CERN)	Development of compact neutron spectrometer	<ul style="list-style-type: none"> <li>Advanced use of Monte Carlo techniques to calculate response function of spectrometer</li> <li>Design, construction and test of spectrometer with reference sources and in stray radiation fields</li> </ul>	<p><u>POLIMI</u>: neutron spectrometry and Monte Carlo (4)</p> <p><u>CTU</u>: neutron spectrometry with Medipix (4)</p>
ESR 2 (CERN)	Dosimetry in mixed fields with Medipix and RP training	<ul style="list-style-type: none"> <li>Advanced use of Monte Carlo techniques to study response of radiation detectors</li> <li>Application of Medipix in dosimetry and microdosimetry in mixed radiation fields</li> <li>Development of RP training modules</li> </ul>	<p><u>CTU</u>: mixed-field dosimetry (2)</p> <p><u>UH</u>: RP training for space programme (4)</p> <p><u>AIT</u>: microdosimetry and advanced use of Monte Carlo codes (2)</p>
ESR 3 (CERN)	Dosimetry in mixed fields with GEM and TEPC	<ul style="list-style-type: none"> <li>Advanced use of Monte Carlo techniques to study response of radiation detectors</li> <li>Development and application of GEM and TEPC in dosimetry and microdosimetry in mixed radiation fields</li> </ul>	<p><u>POLIMI</u>: advanced use of Monte Carlo codes (1)</p> <p><u>UOIT</u>: development of GEM-TEPC (3)</p> <p><u>AIT</u>: application of GEM-TEPC (3)</p>
ESR 4 (CERN)	Medical applications of Si detectors	<ul style="list-style-type: none"> <li>Use of Medipix and Medipix-like detectors in clinical beams</li> <li>Measurements of secondary radiation at clinical facilities</li> </ul>	<p><u>UOW</u>: Training in medical dosimetry (2)</p> <p><u>IBA</u>: use of Medipix-like systems in X-ray dosimetry (2)</p>



# Secondments (AIT)

ESR 5 (AIT)	Characterisation of TEPC for space and medical applications	<ul style="list-style-type: none"> <li>• TEPC measurements with different sources and particle beams</li> <li>• Simulations of energy deposition in TEPC by Monte Carlo simulations</li> </ul>	<p><u>CERN</u>: measurements in stray radiation fields around particle accelerators (2)</p> <p><u>UOIT</u>: Development of GEM-TEPC (3)</p> <p><u>POLIMI</u>: Advanced Monte Carlo simulations (2)</p>
ESR 6 (AIT)	Development of nano dosimeter	<ul style="list-style-type: none"> <li>• Development of novel dosimeter based on nano technology</li> <li>• Comparative measurements of the performance of nano detector with other devices</li> </ul>	<p><u>CERN</u>: detector measurements (3)</p> <p><u>POLIMI</u>: electronics development for nano dosimetry (3)</p> <p><u>UOW</u>: microbeam access (2)</p>



# Secondments (CTU)

ESR 7 (CTU)	Development of radiation-hard radiation field monitor	<ul style="list-style-type: none"> <li>• Operating of the Medipix/Timepix devices</li> <li>• Hardware design, single-wire protocol development</li> <li>• Instrumentation tests in reference fields</li> <li>• Radiation hardness studies of electronics</li> </ul>	<p><u>CERN</u>: measurements in mixed radiation fields, dosimetry-related electronics development (4)</p> <p><u>UH</u>: space-specific hardware development (2)</p>
ESR 8 (CTU)	Development of Medipix-based educational tool	<ul style="list-style-type: none"> <li>• Operating of the Medipix/Timepix devices</li> <li>• Development of user-friendly software interface</li> <li>• Preparation of the exercise set</li> </ul>	<p><u>Jablotron</u>: cooperation on educational kit preparation (2)</p> <p><u>UOW</u>: user-friendly interface (2)</p>
ESR 9 (CTU)	Optimization of mixed-field data evaluation	<ul style="list-style-type: none"> <li>• Operating of the Medipix/Timepix devices</li> <li>• Development of data evaluation algorithms and procedures for mixed field recognition</li> <li>• Simulation of the device response and comparison with measurements</li> <li>• Radiation hardness studies of detector (data distortion caused by radiation)</li> </ul>	<p><u>AIT</u>: advanced use of Monte Carlo codes (2)</p> <p><u>CERN</u>: measurements in mixed radiation fields (2)</p> <p><u>POLIMI</u>: data evaluation algorithm and comparison with CR-39 (2)</p>

# Secondments (IBA)

ESR 10 (IBA)	Development of detector system for medical Quality Assurance	<ul style="list-style-type: none"> <li>• Characterisation measurements with semiconductor detector system</li> <li>• Adaption of sensor system to medical needs</li> <li>• Development of characterisation methods for spectrum and dose</li> </ul>	<p><u>FAU</u>: Simulation and measurements of detector response to x-ray radiation, development of unfolding techniques and quality parameter estimation (8)</p> <p><u>POLIMI</u>: measurements with reference radiation (1)</p>
ESR 11 (IBA)	Mixed field dose determination with pixel detectors	<ul style="list-style-type: none"> <li>• Develop setup and method to determine surface dose Hp(0.07) for gamma and electron mixed field radiation with pixel detectors especially for energies in the therapeutic range (MeV)</li> <li>• Development of pixel detector setup and method to measure neutron dose (thermal and MeV)</li> </ul>	<p><u>FAU</u>: development of algorithm to determine gamma/electron dose and neutron dose (7)</p> <p><u>CERN</u>: characterization and evaluation of electronics (1)</p> <p><u>CTU</u>: Qualification measurements (1)</p>

# Secondments (Jablotron – MI.AM)

<p>ESR 12 (Jablotron)</p>	<p>Development of Medipix-based radiation monitoring system</p>	<ul style="list-style-type: none"> <li>• Design of the Medipix/Timepix monitoring system</li> <li>• Investigation of possible applications</li> <li>• Advanced marketing training</li> </ul>	<p><u>CTU</u>: cooperation on Medipix/Timepix detector development and preparation of educational kit (4) <u>MI.AM</u>: radon applications (3)</p>
<p>ESR 13 (MI.AM)</p>	<p>Neutron dosimetry and spectrometry with CR-39</p>	<ul style="list-style-type: none"> <li>• Design and sensitivity simulation of the CR-39 based spectrometer</li> <li>• Simulations of energy deposition in CR-39 by Monte Carlo simulations</li> <li>• Measurements in complex radiation fields</li> <li>• Comparative measurements with TEPC, Medipix and GEM</li> </ul>	<p><u>POLIMI</u>: Measurements with PuBe source and improvement in the track analysis algorithm (5) <u>CERN</u>: measurements in mixed radiation fields (2) <u>AIT</u>: training in MC codes, comparison with TEPC (2)</p>



# Secondments (POLIMI)

<p>ESR 14 (POLIMI)</p>	<p>Solid state microdosimetry</p>	<ul style="list-style-type: none"> <li>• Design, construction and test of the electronic chain associated to the silicon detector</li> <li>• Simulation of the detector response with Monte Carlo codes</li> <li>• Measurements in complex radiation fields</li> <li>• Comparative measurements with TEPC, Medipix and GEM</li> </ul>	<p><u>CERN</u>: feasibility study for microdosimetry using Medipix read-out electronics (3)  <u>ST-I</u>: design and production of silicon microdosimeter (2)  <u>CTU</u>: Medipix comparative measurements (1)</p>
<p>ESR 15 (POLIMI)</p>	<p>CR-39 and active detector for pulsed neutron fields</p>	<ul style="list-style-type: none"> <li>• Design, construction and test of the electronic chain (log-amplifier, acquisition unit)</li> <li>• Design and construction of the neutron moderator surrounding the inner detector and simulation of the detector response with MC codes</li> <li>• Comparative measurements in complex radiation fields</li> </ul>	<p><u>CERN</u>: measurements in pulsed radiation fields around particle accelerators (3)  <u>MI.AM</u>: exploitation of CR-39 treatment procedures (3)</p>



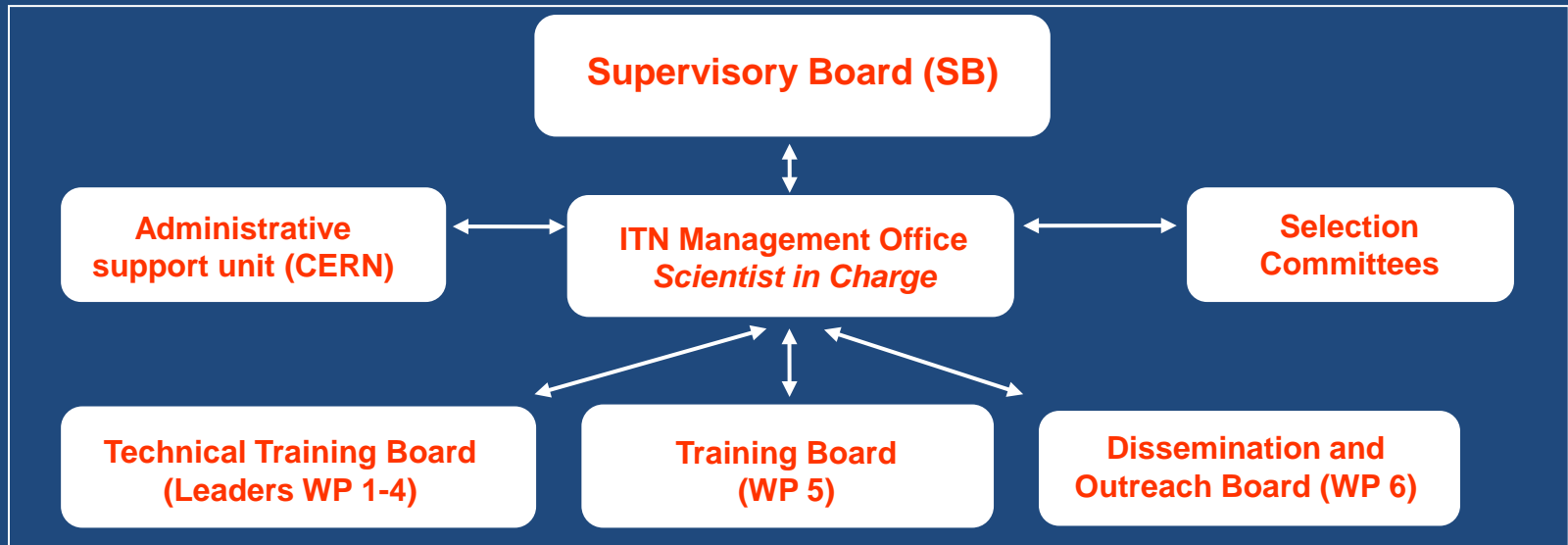


## Career Development Plan

- ✓ Pre-assessment (*at the time of appointment*)
- ✓ Personal Career Development Plan (PCDP) - **Include PhD!**
- ✓ Progress monitoring and evaluation (*every 6 months*)
- ✓ Towards the next employment



# ARDENT Structure



<http://cern.ch/ardent>

# Management meeting schedule

## First year

Meeting no.	Tentative timing, i.e. after month X = end of a reporting period	Nature	Comments
1	After project month: <b>3 (April)</b>	Kick-off	All partners
2	After project month: <b>4 (May)</b>	MO, TTB, TB, DOB	Individual meetings, webcast
3	After project month: <b>6 (July)</b>	SB, MO, TTB, TB, DOB	Individual meetings
4	After project month: <b>8 (September)</b>	MO, TTB, TB, DOB	Individual meetings, webcast
5	After project month: <b>10 (November)</b>	SB, MO, TTB, TB, DOB	Individual meetings during 1 <sup>st</sup> Workshop
6	After project month: <b>12 (January)</b>	SB, MO, TTB, TB, DOB	Individual meetings, webcast

*SB = Supervisory Board, MO = ITN Management Office, TTB = Technical Training Board, TB = Training Board, DOB = Dissemination and Outreach Board*



# Selected milestones

WP	N°	Milestone	Lead beneficiary	Month
WP7	M1	Kick-off meeting	CERN	4
WP6	M2	WEB page availability	AIT	3
WP7	M3/8/13/14	Annual SB meetings	CERN	12/24/36/48
WP2	M4	Timepix based system	Jablotron	15
WP1	M5	Comparison of detector technologies	AIT	18
WP1/2	M6	Choice of detector technology	CERN	18
WP2	M7	Single wire interface	CTU	21
WP5	M9	Survey on formal training	IBA	26
WP2	M10	Comparison of different data evaluation approaches	CTU	28
WP2	M11	Si microdosimeter characterisation	POLIMI	28
WP3	M12	LET spectrometry with CR39	POLIMI	30
WP4	M13	Instrument intercomparison	CERN	30



# Deliverables (first 24 months)

WP	N°	Deliverable	Lead beneficiary	Month
6	D6.1	ARDENT web site platform	Jablotron	3
5	D5.1-4	Workshop and training courses	IBA	10/22/34/46
6	D6.2-5	Educational material	Jablotron	10/22/34/46
7	D7.1/3/5/7	Annual SB meetings	CERN	12/24/36/48
7	D7.2/4/6/8	Progress/periodic reports	CERN	12/24/36/48
1	D1.1	Report on measurements (ESR5)	AIT	15
2	D2.1	Prototype of Timepix based system (ESR12)	CTU	15
3	D3.1	Report 1 <sup>st</sup> pulsed field measurements (ESR15)	POLIMI	15
2	D2.2	Report on first version of exercises (ESR8)	CTU	18
6	D6.6	POLIMI 150 <sup>th</sup> anniversary	Jablotron	18
1	D1.2	Report 1 <sup>st</sup> prototype test measurements (ESR3)	AIT	21
2	D2.3	Personal dosimeter prototype (ESR11)	CTU	21
2	D2.4	First prototype of single wire interface (ESR7)	CTU	21
3	D3.2	Report on preliminary measurements in complex field (ESR13)	POLIMI	21
2	D2.5	Reports on measurements (ESR2)	CTU	24
2	D2.6	Reports on measurements (ESR4)	CTU	24
3	D3.3	Intermediate report on feasibility study for nanodosimeter (ESR6)	POLIMI	24
6	D6.7	Video documentary	Jablotron	24

