AgRefine - ***A Disruptive Innovative Cooperative Entrepreneurial (DICE) education, training and skills development programme rolling out the next generation of Agri Biorefinery and Valorisation Bioeconomy leaders.***

Marie Skłodowska Curie European Training Network

15 PhD positions available under Innovative Training Networks (ITN) of Horizon 2020

Europe's agri-sector is facing both a sustainability and socio-economic challenge due to the combined challenges of increasing environmental pressures through fossil fuel consumption and waste generation (~10% of total EU greenhouse gas emissions), increasing dependence on imported plant-based protein sources (feed), and lack of well-paid rural employment. Biorefinery and waste to energy (WTE) technologies that are being promoted as mechanisms by which agricultural challenges can be simultaneously addressed, have until now been presented as stand-alone agri-valorisation systems and not integrated processes that holistically take into consideration the technical and socio-economic aspects of all operations from input feedstocks to end- and side-products. The AgRefine ITN project proposes to disrupt the mechanism by which biomass is currently being used by cooperatively integrating innovative stand-alone technologies so that the highest value, socio economically beneficial products per input substrates, can be achieved (entrepreneurial).

The goal of the AgRefine Network is to train PhD students to become the bioeconomy leaders of tomorrow with the necessary skills and knowledge to position Europe as the global leader in developing an agri-bioeconomy industry based on advanced biorefinery technologies. The AgRefine integrated training programme will facilitate the amelioration of Europe's agri-sector competitiveness and environmental sustainability challenges by creating new and optimising current agri-resource and agri-waste valorisation pathways. AgRefine will achieve this by bringing together a world-class consortium with experts from 5 European Universities (with expertise in biorefinery technology, engineering, life cycle assessment, economics), 1 applied research institute, 8 industry partners (from engineering, anaerobic diegestion and biorefinery industries), 1 regulatory body and 1 industry network representing 6 countries. The goals of the network will be achieved by a unique combination of "hands-on" research training, non-academic placements, summer schools and workshops on research-related and transferable skills facilitated by the academic and non-academic composition of the consortium. An important element of the training network is the Network wide training events and industry secondments and the emphasis on training all PhD students in key transferable skills.

The project is coordinated by Dr. Fionnuala Murphy, School of Biosystems & Food Engineering, University College Dublin.

The project is currently recruiting 15 post-graduate researchers with specialisation in Microbial/Chemical/Biochemical Engineering, Process Engineering, Biosystems and Food Engineering, Environmental Science, Economics or related disciplines.

Positions are offered for 3 years for the following individual research projects:

Project #	Title of PhD Project	Host
1	**Three phase bio-reactor biosensor development.** A biosensor technology which has been created in UCD to monitor and control grass-silage fed two-phase anaerobic digestion systems will be expanded upon to produce an automated monitoring and control system for AgRefine's Three Phase Bioreactor (TPB). The biosensor that will be created will be capable of detecting total-amino acids as well as an array of volatile fatty acids, in leachates generated by the TPB. Real time detection and quantification of these analytes will allow for the automated monitoring and control system to be created. Initially based in UCD under the supervision of Prof. McDonnell with input from Prof. C Murphy and Dr. Sweeney, the successful candidate will be trained on: • Biosensor creation and operation techniques, • The identification and screening of catabolic pathways capable of catabolising specific amino acids as well as D-, L- lactic acid and butyric acid, within numerous microorganisms, • Genetically engineer specific microorganisms using a suite of genetic engineering techniques which will include Crispr Cas9, to create analyte specific biosensors, • Creating and deploying the TPB's automated monitoring and control system. **Relevant disciplines;** To fulfil this role the candidate must have achieved a Master level degree in Microbiology/Biochemistry or related discipline. Any additional computer programming/ Electronic engineering experience, although not crucial, will be deemed advantageous.	University College Dublin, Ireland
2	**Downstream contaminant removal purification process.** The quality and value of lactic acids (LA) produced by AgRefine's Three Phase Bioreactor (TPB) are inversely proportional to the number of contaminants present within the input substrates used (grass-silage). Regardless of the quality of the input substrate, several organic acid contaminants will exist in all lactic acids produced. To this end, the successful candidate will create genetically engineered microorganisms that will remove these contaminants, resulting in increased LA purity and thus increased product value. Building upon a large E. coli knockout catalogue, which has been created to facilitate the production of UCD's various organic acid specific biosensors, genetically engineered E. coli strains will be assessed, for their ability act as butyric-, acetic-, propionic- and valeric-acid contaminant removers.	University College Dublin, Ireland

	Initially based in UCD under the supervision of Prof. McDonnell with input from Prof. C Murphy, Dr. Sweeney and Mr. Mandl the candidate will: • Be trained on biosensor creation and operation techniques, • Apply a suite of genetic engineering techniques to create a butyric acid degradation E. coli isolate, • Screen for additional microorganisms that may be more suited to the contaminant removal process (where if successful genetic engineering will be applied), • Collaborate with CERTH to deploy the contaminant removal microorganisms to their proposed membrane bioreactor (MBR). **Relevant disciplines;** To fulfil this role the candidate must have achieved a Master level degree in Microbiology/Biochemistry or related discipline. Any additional Computer programming/ Electronic-, Chemical- or process-engineering experience, although not crucial, will be deemed advantageous.	
3	**Process optimization for enhanced lactic and amino acid production** Lactic acid (LA) and amino acids (AA) are the major fermentation products of ensiling process. LA and AA production is challenging due to secondary clostridial fermentation at implementation of poor ensiling techniques, producing undesirable by-products which reduce the quality of the LA and AA produced. Several parameters and variables are elucidated to increase LA and AA production from grass- and seaweed-silage fed to the TPB reactor. Initially based in DTU under the supervision of Prof. Angelidaki with input from Dr. Tsapekos, the successful candidate will: • Be trained on fermentative LA production, examining various process optimisation approaches using both pure and mixed microbial cultures, • Examine the isolation of microbes from different environments to establish a bioaugmentation platform to achieve higher LA and AA yields, • Assess different pre-treatment techniques and optimal TPB-1st phase reactor configurations, • Be seconded to Samtech Extraktionstechnik GmbH (Austria) to gain a deeper understanding of 1st phase LA and AA water extraction processes and biosensor operation. **Relevant disciplines;** To fulfil this role the candidate must have achieved Master level degree in Chemical Engineering or Biotechnology Biochemistry, Microbiology or related discipline. Any additional fermentation, isolation, or process-engineering experience, will be deemed advantageous.	Technical University of Denmark

4	**Enhanced TPB-3rd phase biorefinery lactic acid and amino acid generation and recovery.** The "Green Biorefinery" process – initially developed in TUW and TBW to receive lactic acid and amino acids from grass silage press liquor - shall be improved by specific analytics of the grass-silage leachates, by optimising downstream AA and LA purification processes including membrane separation (ultrafiltration, nanofiltration, electrodialysis, diafiltration concepts) and chromatographic separation, and by the implementation of novel technologies that could significantly increase cost effectiveness and product quality. Initially based in TUW and under the supervision of Prof. Harasek with input from Mr. Mandl (TBW), the successful candidate will: • Operate lab-scale separation equipment to identify key process parameters (ultrafiltration, nanofiltration / electrodialysis for LA, nanofiltration and chromato-graphic process for AAs), • Derive and implement an ASPEN process simulation toolbox of the downstream process, • Find new and optimise current downstream processing strategies through process simulation with regard to product quality, resource and energy efficiency, • Get trained at UCD for 3 months under the supervision of Prof. Murphy on both biosensor operation and contaminant removal processes, • Move to Innolab (Belgium) under the supervision of Mr. Willems to receive an understanding of their expansive analytical and AD simulation technologies. **Relevant disciplines;** The candidate must have a Master level degree in chemical engineering, physics, biochemical engineering or related discipline. Experience and interest in separations engineering, membrane separation processes is desired. The candidate should have basic knowledge about process simulation tools (e.g. ASPEN).	Technische Universität Wien, Austria
5	**Bio-succinic production from TPB-2nd phase biogas and AD-biorefinery residues** Succinic acid (SA) is commonly produced from petrochemicals. When SA is produced via fermentation, CO2 is consumed. The unique process developed by DTU integrates biogas upgrading with SA based-fermentation, whereby gaseous CO_2 provided from biogas and carbohydrates will be provided directly from pressed grass/seaweed are converted into two products: bio-methane (CH4>95%) and bio-SA (green building block). Additionally, ensiled grass/seaweed produced by TPB's 3rd phase reactor will be used as alternative carbohydrate source for bio-succinic acid production.	Technical University of Denmark

	Initially based at DTU under the supervision of Prof. Irini Angelidaki and Dr. Merlin Alvarado-Morales, the suitable candidate will: • Develop and validate at lab-scale, an efficient conversion process to produce bio-SA from gaseous CO_2-rich streams and sugar-rich hydrolysates (produced from pressed grass and seaweed), using Actinobacillus succinogenes 130Z as the fermentative organism, • Screen for a more robust and stable industrial organism which will be more suited to the needs of the TPB, • Perform microbial strain improvements whereby a novel process technology and novel CO_2 supply system for enhancing conversion efficiencies of the fermentation-based processes, will be implemented and tested at lab-scale, • Go to Avecom (Belgium) for a secondment under the supervision of Prof. Verstraete, to learn about their manufacturing and production practices whereby insights into their applicability to the bio-SA bio-methane production processes can be obtained. **Relevant disciplines;** The candidate must have a Master level degree in chemical engineering, biotechnology, biochemistry or related discipline. Any additional mathematical modelling, bioprocess engineering, microbiology, lab experience will be deemed advantageous.	
6	**A continuous flow contaminant removal membrane bioreactor system for LA purification using GMOs.** Production cost of high purity Lactic Acid (LA) in Green Biorefinery processes is significantly burdened by the cost of conventional purification operations. Toward a novel LA production scheme, UCD has developed GMOs that can selectively catabolize undesirable organic acids (e.g. contaminants). This study aims to develop and optimize an efficient LA purification method (using GMOs), by employing a novel continuously operating Membrane Bioreactor (MBR), wherein a biological process (contaminant removal) is integrated with a physical separation process (membrane filtration) in a single operation. Therefore, a multidisciplinary approach should be developed, taking into consideration the interrelating biological, chemical and physical phenomena involved. The candidate will be based in CERTH, the largest R&D Centre in northern Greece and will be registered at Technische Univ. Wien (TUW). The candidate, under the supervision of Prof. A.J. Karabelas (CERTH) with inputs from Dr. S.I. Patsios (CERTH) and Prof. M. Harasek (TUW) will be trained on:	Centre for Research and Technology Hellas, Greece (registered at Technische Universität Wien)

	• Development of analytical tools and monitoring techniques for hybrid biological/membrane separation processes (MBR), • Operation and process optimisation of hybrid biological/membrane separation processes (MBR), • Key operating issues, notably membrane fouling monitoring and mitigation techniques. **Relevant disciplines**; To fulfil this role, the candidate must have obtained a Master level degree in Chemical or Biochemical Engineering. Any additional degree and related experience in the fields of biology or biotechnology will be deemed advantageous.	
7	**Ensiled seaweed as an alternative biorefinery input substrates.** The project will involve investigating a novel seaweed-ensiling process as an alternative to drying to preserve seaweeds nutritional and monetary value. The study will also investigate the waste effluent produced by the silage. The successful candidate will also be tasked with implementing seaweed cultivation optimisation strategies with the aim of maximising seaweed protein and/or mannitol content. The candidate will be based in Bantry Marine Research Station, in west Cork, Ireland and will be registered University College Dublin (UCD). The candidate will work under the supervision of Dr Julie Maguire (BMRS) with inputs from Prof. Kevin McDonnell (UCD). **Relevant disciplines;** The successful candidate must have obtained a Master level degree in biology and work well in a multidisciplinary team. They should be confident in both analytical lab and running field experiments. Experience in phycology and/or productivity measurements will be an advantage.	Bantry Marine Research Station, Ireland (registered at University College Dublin)
8	**Bioeconomy Supply Chain Management** The successful management of biorefinery supply chains requires decisions on hierarchical processes across the full chain; from location of the biorefinery plant, resource allocation, to daily distribution of bio-feedstock and end products. Models based on Geographical Information Systems (GIS) and Operation Research methodologies are now being used for strategic, tactical and operational decisions. However, research on the design of supply chains for biorefineries-AD hybrids are lacking. Initially based in UCD under the supervision of Dr. F Murphy, this PhD project will analyse the role of reverse logistics as a critical enabler within the circular economy and will provide clear strategies for optimising reverse logistics processes so that they can be embedded within AgRefine's bioeconomy model. The PhD student will develop a framework and model for Supply Chain Management defining the mechanisms of an efficient grass and seaweed-silage	University College Dublin, Ireland

	biofeedstock and product management system, considering innovative aspects such as demand fluctuations, government incentives, and uncertainty and will test the developed model in an industry setting. **Relevant disciplines**; To fulfil this role, the candidate must have obtained a relevant Master level degree with a strong focus on Supply Chain Engineering/Management/Analysis, Logistics, Operations Research, Computer Programming.	
9	**Nutrient Recovery.** EU agriculture is heavily import-dependent for synthetic fertilisers such as ore for phosphorus (P) and fossil fuel for nitrogen (N), and their use results in large environmental impacts at local, regional and global scales. To counteract this, there is a need for increased substitution of nutrients in synthetic mineral fertiliser with waste-derived nutrients originating from bio-based sources. The successful candidate will investigate; mass flows of both major (N, P, K, Ca, Mg, S) and minor nutrients (Cu, Zn, Fe) as well as organic carbon in the downstream processing of digestates exiting AgRefine's TPB 1st phase; a cascade of recovery techniques that will allow production of multiple refined organo-mineral fertilisers, soil enhancers and growth substrates; and a novel Nitrogen (NH_3/NH_4) stripping/scrubbing process. The candidate will further investigate the novel continuous N recovery technique by comparing and contrasting it to current post-AD-digestate nitrogen removal techniques. Initially based at UGent under the supervision of Prof. Meers, the candidate will undertake another secondment to Tipperary Country Council (Ireland) to examine the regulatory aspects governing use of digestates. **Relevant disciplines;** To fulfil this role, the candidate must have obtained a a relevant Master level degree in applied biological sciences (agriculture, environmental technology).	Gent University, Belgium
10	**Three-phase-bioreactor scalability and Anaerobic Digestion-retrofitting analysis.** The retrofitting of existing Anaerobic Digestion (AD) reactors requires that existing AD units to be synergistically integrated as TBP's 2nd phase reactors. However, AD configurations vary significantly with regard to geometries of mixers, power input requirements, feedstock rheology, fermenter geometry (size and presence of baffles etc.) and gas productivity. To find cost effective and optimally operated retrofitting, nowadays modelling is preferably applied to predict and quantify possible achievements before any pilot or full-scale deployment can be commissioned. Computational Fluid Dynamics (CFD) which allows the time-resolved calculation of 3D flow fields to analyse local velocities, turbulence, pressure, concentration, shear rate dependent viscosity effects, local reaction rates and more will	Technische Universität Wien, Austria

	be implemented to achieve this. The successful candidate will work with the experienced CFD researchers' team at TUW. Initially based in TUW and under the supervision of Prof. Harasek with input from Mr. Mandl (TBWR), the successful candidate will: • Learn opensource CFD modelling focussing on the computation of large-scale AD reactors, • Develop and implement modelling concepts based on DoE to improve the geometric design and to find optimal operating conditions under design constraints e.g. with regard to retrofitting, • Be seconded to European Biogas Association (Belgium) to gather process data on existing AD systems, • Stay with Enviro-Eye Engineering (Ireland) under the supervision of Mr. Galvin to learn about the application of "Energy Efficient Design" according to IS399/ISO50001 standards, • Disseminate an open source CFD toolbox for the flow investigation of the TPB systems. **Relevant disciplines;** The candidate must have a Master level degree in chemical engineering, physics, mechanical engineering or related discipline. Experience and interest in experimental fluid dynamics, computational fluid dynamics and/or C/C++ programming is desired.	
11	**Product Substitution.** Carbolxylic (i.e LA) acids have a huge market potential, in which different purities can be tolerated, but they are 'commodity' products with relatively low prices. It is known that for many biorefinery options, the downstream processing can easily contribute to over 60% of production cost. The same holds for carboxylic acid purification. This ESR will focus on the development and optimisation of downstream processes for carboxylic acids. It includes both common techniques (extraction, distillation,…), as well as more innovative options (membranes, pervaporation, ion exchange, …). The goal is to outweigh these options. This will be done both experimentally as well as by (ASPEN) simulations to mimic industrial scale processes. A strong interplay is foreseen with the expected application: there is a need to balance product quality/purity and purification cost in order to find a suitable market in which the products can replace fossil-based products. Small application tests might thus also be foreseen. The successful candidate will be hosted in the team of Prof. De Meester at Gent University and will end up in a dynamic team of 15-20PhDs working on purification processes, with extensive experience in chemical engineering and a team dedicated to ASPEN simulations. Furthermore, the lab is equipped with pilot scale separation processes (1-40L) that can be used in this	Gent University, Belgium

	project. Two secondments are foreseen at Samtech Extraktionstechnik GmbH and Clean Energy Solutions (both located in Austria). **Relevant disciplines;** To fulfil this role the candidate must have achieved a Master level degree in a discipline with important focus on Chemical- or process-engineering or bio-engineering. Knowledge of ASPEN is a plus. Being strong experimentally is also a plus (being able to operate pilot equipment). Social skills are equally important.	
12	**Dynamic Life Cycle Assessment** Bioeconomy design strategies must be developed to minimise environmental trade-offs during the transition to sustainability. Increasingly life cycle assessment based on lab scale data is required to prove the sustainability aspects of developing clean technologies. This frequently results in a much higher impact as few LCA studies focus on scale-up of LCA data. A scalable LCA framework is needed to support AgRefine's early stage product development and to provide it with the basis from which a pilot scale process design can be created. Based in UCD under the supervision of Dr. F Murphy, the candidate will develop a dynamic biosensor-linked life cycle assessment framework which will evaluate both environmental aspects of sustainability. The LCA framework will be scalable to produce accurate results for technologies at different stages of development i.e. across TRL levels. The candidate will develop the framework using experimental data (liaising with and will develop a scaling mechanism while on secondment at TU Wien. The LCA framework will be validated on industrial scale processes. **Relevant disciplines;** To fulfil this role the candidate must have obtained a relevant Master level degree in a discipline with a strong focus on; Process/Chemical/Biochemical Engineering, Life Cycle Assessment, Modelling using Python or similar programming languages. The candidate should have basic knowledge of process simulation tools (e.g. ASPEN).	University College Dublin, Ireland
13	**Assessment of green biorefinery archetypes and implementation scenarios.** Market uptake of new products and technologies depends on the complex interplay of several factors which include cost, physical properties, compliance with regulation, and existing market structures. Although biobased products may look attractive from other perspectives, a company will have little incentive to develop them, unless profitability can be ensured. This task will focus specifically on AD as a core existing technology and defining the economic case for clip-on modules to upgrade ADs to AgRefine's biorefinery technology. Initially based in TBWR and under the supervision of Mr. Mandl with input from Prof. Harasek (TUW), the successful candidate will:	TBW Research, Austria (registered at Technische Universität Wien)

	• Undertake an in-depth market analysis of the existing AD and biorefinery sectors, producing market reports in the area of biogas, bio-based products and feedstocks, • Assess current legislation frameworks in use for licensing AD plants across Europe where different member states have approached licensing in different ways, • Be seconded to the European Biogas Association (Belgium) to assess the market potential of retro-fitting existing digesters so that they can be converted to new multi-product systems, • Be seconded to UGent and under the supervision of Dr Steelman will carry out cost accounting of the implementation scenarios developed, • Assess the biorefinery system on an extended scale or parameter matrix beyond currently applied pure economic driven assessment practices, • Provide an overarching strategy for implementing AgRefine technology including recommendations on future policy frameworks for biogas and biorefinery development. **Relevant disciplines;** The candidate must have a Master level degree in chemical engineering, physics, biochemical engineering or related discipline. Experience and interest in economics and/or economic and ecologic effects of technical developments is desired.	
14	**Financial sustainability and sustainable business models.** In assessing the economic performance of value chains, a common element is to identify the different actors, activities, flows, inputs and outputs through the 'mapping of value chains'. Traditional 'vertical' mapping provides a linear description of product flows generally including only those actors who participate actively in the product lifecycle. Such approach ignores external actors (such as universities, research institutes, and governments) who could have a significant impact on value chain performance. Initially based at Gent University under the supervision of Prof. Speelman, the candidate will develop a novel framework to identify linear and non-linear actors in the value chain to determine and quantify the impacts on the bioeconomy, agricultural and related sectors. Linked to this the candidate will identify, develop and evaluate the financial sustainability of innovative business models for the AgRefine sector. **Relevant disciplines**; the candidate must have obtained a Master level degree in Agricultural or resource economics, supply chain analysis, bio-economic modelling.	Gent University, Belgium

15	**Enabling Governance Arrangements for Next Generation Agri Biorefinery Technology.** The development of innovative biorefinery technologies inherently challenges existing policies and legal frameworks, and may trigger societal controversies due to uncertainties, conflicting frames, or poor stakeholder involvement. This PhD project will: i) analyse the mechanisms contributing to (potential) controversies; (2) design and experiment with stakeholder involvement arrangements to enable responsive innovation; (3) identify mismatches with current EU and domestic policies, and (4) propose policy frameworks that encourage agri biorefinery technology. The candidate will be based at the Public Administration and Policy Group of Wageningen University, the Netherlands, which has the mission of studying the governance of wicked problems in the life sciences domains to develop more effective and legitimate governance arrangements. The supervisors of the project will be prof. dr. C.J.A.M. Termeer, dr. T.A.P. Metze and dr. J.J.L. Candel. **Relevant disciplines;** the candidate must have obtained a Master level degree political sciences, public administration, environmental governance, innovation studies. Affinity with governance, policy and/or institutional theories will be deemed advantageous.	Wageningen University & Research, Netherlands

Candidates

We are looking for talented and highly motivated early career researchers educated in Science, Technology, Engineering and related disciplines. We expect dedication and enthusiasm for experimental research, combined with scientific curiosity and the capacity to teamwork in an interdisciplinary environment. Positions are open from October 1st 2019, until the positions are filled (at the latest January 1st 2020) and ESRs will be based in Ireland, Belgium, the Netherlands, Austria, Denmark or Greece.

Admission criteria

Candidates must have not been awarded a doctoral degree and should be in the first four years of their research career. Candidates must have an educational background relevant for the chosen position (individual research project). Candidates must have excellent proficiency in written and spoken English (at least level B2) and fulfil the specific University recruitment criteria of each position. Candidates can be of any nationality but need to demonstrate mobility in terms of moving from one country to another when taking up their appointment. Importantly, candidates must not have resided or carried out their activities - work, studies, etc.- in the country of their host organization for more than 12 months in the 3 years immediately prior to the PhD start date (see *H2020 MSCA Mobility Rule* below).

Specific requirements

- Applicants can be of any nationality.

- Applicants must be eligible to enrol on a PhD programme at the host institution (or at a designated university in case the host institution is a non-academic organisation).

H2020 MSCA Mobility Rule: researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of the host organisation for more than 12 months in the 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status are not included in this 12-month period.

H2020 MSCA eligibility criteria: Early Stage Researchers (ESRs) must, at the date of recruitment by the host organisation, have less than four years of full-time equivalent research experience and have not been awarded a doctoral degree. Full-Time Equivalent Research Experience is measured from the date when the researcher obtained the degree entitling him/her to embark on a doctorate (either in the country in which the degree was obtained or in the country in which the researcher is recruited, even if a doctorate was never started or envisaged).

How to Apply

Please submit your application via this link https://forms.gle/Pfis4D3v6xDF1Qk59

Candidates can apply for a maximum of three positions. Applicants must include their CV, detailed academic transcripts in the form of certified copies of all undergraduate and postgraduate level certificates, a motivation letter and three reference letters from previous professors or mentors. Applicants must have an ability to understand and express themselves in both written and spoken English to a level that is sufficiently high for them to derive the full benefit from the network training. Candidates must have excellent proficiency in written and spoken English (CEFR Level C1) and provide evidence that they fulfil the specific University recruitment criteria of each position.

Application Deadline: 2nd September 2019.

Selection process
Pre-selection: based on CV, experience, skills and motivation letter.
Interviews: Short-listed candidates will be interviewed.

Employment

3-year full-time employment contract will be issued in accordance with the Marie Skłodowska-Curie Action regulations for Early Stage Researchers. All hired researchers will be registered on Doctoral Programmes at relevant institute and participate in all training events and undertake mobility with selected industry partners. In case the student is enrolled in a doctoral programme in a country where the duration of the PhD study is beyond the 3-year-MSCA contract, additional funding for the additional year(s) will need to be sought.

The successful candidates will receive an attractive salary in accordance with the Marie Skłodowska-Curie Actions (MSCA) regulations for early stage researchers. The exact salary will be confirmed upon appointment and is dependent on the country correction coefficients (to allow for the difference in cost of living in different EU Member States).

Envisaged Start Date: between October 1st 2019 and January 1st 2020.