

Development of a high flowrate size resolved nanoparticles sampler

Location :	PARIS-SACLAY (https://www.cea.fr/Documents/plans-des-centres/cea_saclay_map.pdf)
Laboratory :	IRSN – Aerosol Physics and Metrology Laboratory (https://www.irsn.fr/FR/Larecherche/Organisation/equipes/surete-nucleaire/LPMA)
Duration :	18 Months
Availability :	September 2021

Institut de Radioprotection et de Sûreté Nucléaire, IRSN, a public expert with industrial and commercial activities, was set up in 2001. The Institute is placed under the joint authority of the Ministries of Defense, the Environment, Industry, Research, and Health. It is the nation's public service expert in nuclear and radiation risks, and its activities cover all the related scientific and technical issues.

The decree n°2016-283 of 10 March 2016 ([view the decree in French](#)) entrusts IRSN with missions of expertise and research in the following areas: nuclear safety, safety of transport of radioactive and fissile materials, protection of man and the environment against ionizing radiation, protection and control of nuclear materials, protection of nuclear facilities and transport of radioactive and fissile materials against malicious acts.

IRSN wishes to develop an aerosol sampler, of a new type, allowing particle size selection and collection at a high flow rate as part of its studies and expertise on radionuclides under particulate forms in the air.

IRSN will entrust the study to a development researcher who will have at his or her disposal unique experimental resources (aerosol generators, particle size analyzers, experimental chamber dedicated to aerosols) to perform tests and evaluate the performance of the device in laboratory conditions. The total duration of the study is 18 months. The work will be carried out on the CEA site in Saclay, south of Paris at the Aerosol Physics and Metrology Laboratory of the IRSN. The team Lab is specialized both in aerosol behavior understanding and characterization. The desired candidate must have a perfect knowledge of the laws governing the particles behavior in a fluid according to its sizes and must have a PhD specialized in fluid mechanics, aerosol metrology, or environmental sciences. Experience in the field of aerosol metrology by impaction, electrical mobility, diffusion, particle size selection and collection efficiency function establishment will be critical. The candidate will have to report on the progress of his work, write notes, present his work and will interface with various stakeholders (head of laboratory, technicians, IRSN's partners).

This project includes a dimensioning phase comprising theoretical calculations and laboratory measurements. Secondly, a prototype will be produced, tested and corrected when necessary. The development researcher will write specifications, will be in charge of relations with a subcontractor in charge of producing the parts and will carry out validation tests in the laboratory. Once the collection efficiency functions of the prototype are established, the development researcher will establish a data processing program by numerical inversion of the Fredholm's equation.

Finally, the validated prototype will be derived in an industrialized version in partnership with a company specialized in laboratory devices manufacturing.

Field experiments can complete the prototyping and pre-industrial validation stages. Writing scientific papers reporting on experimental work will be encouraged and appreciated.

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