

Abstract Submitted
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Miniaturized inertial impactor for personal airborne particulate monitoring: Prototyping¹ SILVIA PASINI, ELENA BIANCHI, GABRIELE DUBINI, LUCA CORTELEZZI, Politecnico di Milano — Computational fluid dynamic (CFD) simulations allowed us to conceive and design a miniaturized inertial impactor able to collect fine airborne particulate matter (PM₁₀, PM_{2.5} and PM₁). We created, by 3D printing, a prototype of the impactor. We first performed a set of experiments by applying a suction pump to the outlets and sampling the airborne particulate of our laboratory. The analysis of the slide showed a collection of a large number of particles, spanning a wide range of sizes, organized in a narrow band located below the exit of the nozzle. In order to show that our miniaturized inertial impactor can be truly used as a personal air-quality monitor, we performed a second set of experiments where the suction needed to produce the airflow through the impactor is generated by a human being inhaling through the outlets of the prototype. To guarantee a number of particles sufficient to perform a quantitative characterization, we collected particles performing ten consecutive deep inhalations. Finally, the potentiality for realistic applications of our miniaturized inertial impactor used in combination with a miniaturized single-particle detector will be discussed.

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