The NEWTON-g gravity imager: a new window into sub-surface fluid displacement

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The dynamic behavior of subsurface fluids, like water, hydrocarbons, and magma, is critically important for both resource management and risk reduction. Gravimetry is a valuable method to assess the migration of underground fluids as it is the only method to directly track the changes of mass involved in geophysical processes. However, it is not extensively used partly due to the limitations of current instrumentation.

In order to tackle this issue, the Newton-g project was funded under the H2020 FET-OPEN scheme to develop, deploy and exploit a gravity imaging system, whose "pixels" are made of MEMs gravimeters anchored on an absolute quantum gravimeter. Such a new imaging method will provide a means to track subsurface fluid displacements with a high spatio-temporal resolution and the core of this change of paradigm for gravimetry lies in the development of a new set of instrumentations. We report on the design of the gravity imager that will be set-up on Mount Etna volcano (Italy). We also discuss the production of the different gravimeters, the deployment of the array of meters and present the exploitation of the data that will be collected during the last two years of the project.