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Hunting the invisible with ALMA: the path for the first measurement of cold gas and dust in quiescent galaxies.

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The synergy between the Near/Mid-infrared JWST and the sub-mm ALMA telescopes allows to explore the low frequency emission of galaxies with a sensitivity and resolution hardly achieved before. Amongst the many amazing discoveries, this couple of telescopes is deeply revolutionazing our understanding of galaxy evolution by unveiling a population of galaxies with very low star formation, or quiescent, that contains copious amount of cold interstellar medium. These observations, althoug still rare, are changing the current paradigm for the formation of quiescent galaxies, possibly even mining their in-use definition.
In my previous work, I used the state-of-the-art suit of cosmological simulations SIMBA to tackle the physical processes generating dust-rich quiescnet galaxies up to z~2, comparing the effect of internal and environmental mechanisms for star formation quenching on the evolution of the ISM content. We find in SIMBA indications that dust grains can survive for much longer than expected, depending on the balance between the growth rate and the rate of grain destruction operated by the active galactic nucleus.
To test these results, we requested time at the ALMA sub-mm/radio interferometer, which was awarded to us with high priority. As the principal investigator of the awarded project "Hunting the prolongued dust growth in dusty quiescent galaxies at intermediate redshift", I will present the challenges that arise when competing for data in astronomy, and I will give a brief lesson on how the complex ALMA telescope works.

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