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## Research on a novel cosmic ray muon imaging system based on plastic scintillation

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This report presents two innovative muon detection systems developed by the University of South China for transmission imaging technology. The first system introduces a muon detector employing large-area plastic scintillator four corner coupling PMT for pit exploration methods. The second approach involves the design of a compact muon imaging system utilizing plastic scintillator strips coupled with SIPM, tailored specifically for drilling methods enabling deep underground exploration. Simultaneously, a spatial angle muon positioning algorithm suitable for this system was developed. Furthermore, a novel density inversion algorithm was devised for mineral resource exploration, leveraging the capabilities of the two distinct muon imaging systems. Integration of muon imaging data with gravity data enabled the coupling of multiple imaging technologies for enhanced mineral resource exploration. The outcomes of this project are expected to introduce ground-breaking technologies and equipment for imaging the exploration of deep precious metal mineral resources.

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