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Powerful Indirect Constraints on the Origins of UHECRs

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As is now painfully evident, finding the sources of UHECRs is very challenging due to the combination of most UHECRs having intermediate masses, the precision of charge assignments being still crude, and deflections in the Galactic magnetic generally being large. These effects not only smear the images of individual UHECR sources but also lead to a non-trivial and poorly-constrained mapping between a source's direction and the arrival direction distribution of its UHECRs. In the face of this challenge, indirect information on the sources which is imprinted on the spectrum and composition of UHECRs as they emerge from the source surroundings, provides valuable additional information on the nature of the sources. This talk will discuss the resulting constraints on the physical properties of the environment surrounding the source, and a possible picture that emerges when also considering evidence on the number density and diversity of source types.

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