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The Gradual Realization that Astronomical Information is Bounded, 1965-2021 MARTIN HARWIT, Cornell University — The discovery of the Cosmic Microwave Background in 1965 indicated that cosmic messenger energies must be bounded.Gould & Schreder noted that collision with microwave background photons would quickly damp high gamma-ray energies down to 10^{13}eV.Greisen and Zatsepin & Kuzmin, showed that ionic cosmic rays would similarly be bounded at 10^{22}eV.Both limits are by now well established. I will show that gravitational deflection by myriad low-mass bodies, like interstellar planets and comets or dark-matter blobs, impose ultimate bounds also on angular, temporal and spectral resolution.[1]I shall provide examples of resolving powers currently approaching those bounds.Multi-messenger observations will not overcome these because, as general relativity shows, gravitational deflections and time delays affect all messengers identically. At current funding rates world-wide, we will within a century or two attain instrumental capabilities, improvements on which will no longer lead to further astronomical advances. Some astronomical phenomena could remain forever unobservable, showing a need to consider how our knowledge of the Universe then might nevertheless advance.

[1]Martin Harwit,**Cosmic Messengers, The Limits of Astronomy in an Unruly Universe Cambridge University Press** 2021

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