Voyager probing Dark Matter

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About 40 years after its launch in 1977, the famous Voyager-1 spacecraft has crossed the heliopause in 2012. It is now exploring the local interstellar medium and is sending us unprecedented data. This opens up a new avenue to probe the dark matter via cosmic ray electrons and positrons in the sub-GeV energy range. After describing a novel semi-analytical method (pinching method) which provides us a complete description of the transport of electrons and positrons at low energy, I'll present predictions for both the secondary astrophysical background and the pair production mechanisms relevant to dark matter particles annihilation or decay down to the MeV mass range. We combined the constraints from the Voyager and AMS-02 data to get novel and robust limits covering a very extended dark matter particle mass range, from MeV to TeV. For velocity dependent annihilation processes (p-wave), we make use of the Eddington method to compute the phase space distribution function of dark matter particles from the most recent constrained mass model of the Galaxy. Primordial black holes are alternative and also well-motivated candidates for dark matter. Black holes with a mass smaller than ~10^17 g are expected to inject electrons and positrons in the Galaxy through Hawking radiation. I'll show that Voyager is sensitive to signatures from such black holes and I'll present novel constraints on the contribution of primordial black holes to the dark matter in this mass window. Though extracted from a completely different and new probe, these bounds have a strength similar to those obtained with the extragalactic gamma ray background.