Partially ionizing the universe by decaying particles
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abstract We show that UV photons produced by decaying particles can partially reionize the universe and explain the large optical depth observed by Wilkinson Microwave Anisotropy Probe. Together with UV fluxes from early formed stars and quasars, it is possible that the universe is fully ionized at $z=6$ and partially ionized at $z=6$ as observed by Sloan Digital Sky Survey for large parameter space of the decaying particle. This scenario will be discriminated by future observations, especially by the EE polarization power spectrum of cosmic microwave background radiation.