While variability has long been recognized as a distinguishing feature of quasars, the extremes of this behavior have only recently been systematically probed by the current generation of wide-area, multi-epoch surveys. This work has identified a new class of ``changing-look quasars'' in which the strong UV continuum and broad optical hydrogen emission lines associated with unobscured quasars either appear or disappear on timescales of years. The physical processes responsible for this behaviour are still debated, but changes in the black hole accretion rate or accretion disk structure appear more likely than changes in obscuration. Here we report on three epochs of spectroscopy of SDSS J110057.70-005304.5, a quasar whose UV continuum and broad hydrogen emission lines have dramatically faded over the past 20 years. An archival spectrum of this quasar from 2010 shows an intermediate phase of the transition during which the flux below rest-frame 340nm has collapsed. This is unique compared to previously published examples of changing-look quasars, and is best explained by dramatic changes in the innermost regions of the accretion disk. The optical continuum has been rising again since mid-2016, leading to a prediction of a rise in hydrogen emission line flux in the next few months. If our model is confirmed, the physics of 'changing look' quasars are governed by processes at the innermost stable circular orbit (ISCO) around the black hole, and the structure of the innermost disk. Thus, the easily identifiably and monitored Changing Look Quasars would then provide a new probe of the strong gravity regime.