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Time-dependent ac-Stark shift

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We probed the AC Stark shift induced by a few-cycle near infrared laser field in helium bound states using isolated attosecond pulses in a transient absorption scheme. The broadband continuous XUV spectrum of the attosecond pulses covering all the excited states simultaneously were generated by the Double Optical Gating method. We uncovered a sub-cycle energy shift in the $1s3p$ state superimposed on a slower shift that followed the instantaneous laser intensity envelope.