

## Multifrequency studies of the peculiar QUASAR 4C +21.35 during the 2010 flaring activity

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### Abstract

© 2014. The American Astronomical Society. All rights reserved. Printed in the U.S.A. The discovery of rapidly variable Very High Energy (VHE;  $E > 100$  GeV)  $\gamma$ -ray emission from 4C +21.35 (PKS 1222+216) by MAGIC on 2010 June 17, triggered by the high activity detected by the Fermi Large Area Telescope (LAT) in high energy (HE;  $E > 100$  MeV)  $\gamma$ -rays, poses intriguing questions on the location of the  $\gamma$ -ray emitting region in this flat spectrum radio quasar. We present multifrequency data of 4C +21.35 collected from centimeter to VHE during 2010 to investigate the properties of this source and discuss a possible emission model. The first hint of detection at VHE was observed by MAGIC on 2010 May 3, soon after a  $\gamma$ -ray flare detected by Fermi-LAT that peaked on April 29. The same emission mechanism may therefore be responsible for both the HE and VHE emission during the 2010 flaring episodes. Two optical peaks were detected on 2010 April 20 and June 30, close in time but not simultaneous with the two  $\gamma$ -ray peaks, while no clear connection was observed between the X-ray and  $\gamma$ -ray emission. An increasing flux density was observed in radio and mm bands from the beginning of 2009, in accordance with the increasing  $\gamma$ -ray activity observed by Fermi-LAT, and peaking on 2011 January 27 in the mm regime (230 GHz). We model the spectral energy distributions (SEDs) of 4C +21.35 for the two periods of the VHE detection and a quiescent state, using a one-zone model with the emission coming from a very compact region outside the broad line region. The three SEDs can be fit with a combination of synchrotron self-Compton and external Compton emission of seed photons from a dust torus, changing only the electron distribution parameters between the epochs. The fit of the optical/UV part of the spectrum for 2010 April 29 seems to favor an inner disk radius of