

DIFFERENT HISTORY OF COMETS C/2001 Q4 AND C/2002 T7? M. Królikowska¹, P.A. Dybczyński² and G Sitarski¹ ¹Space Research Centre PAS, Bartycka 18A, 00-716 Warsaw, Poland, e-mail: mkr@cbk.waw.pl, ²Astronomical Observatory Institute, A. Mickiewicz Univ., Słoneczna 36, 60-286 Poznań, Poland, e-mail: dybol@amu.edu.pl

Introduction: C/2001 Q4 and C/2002 T7 were included into the group of five comets for which some systematic trends in the O-C time variations were detected by us [1] in the non-gravitational (NG) motion - despite the significant improvements of orbit determinations in the standard type of NG model. Here, we investigate the dynamical status of Q4 and T7 by exploring a grid of models with different ways of constructing astrometric data samples as well as different types of NG acceleration (based on: standard $g(r)$ function [2], $g(r)$ -like function, or Yabushita function [3]; see Ill. 1) taking into account planetary perturbations, full Galactic potential and all known stellar perturbers. Based on [4] we applied two types of data sample dedicated for each of comet: DIST - a subset of observations (for Q4 two slightly different subsets) taken only at larger distances from the Sun, PRE - a subset of data from incoming leg of orbit at larger distances from the Sun, and next we compared the derived results with those obtained for all available astrometric data (sample: ALL).

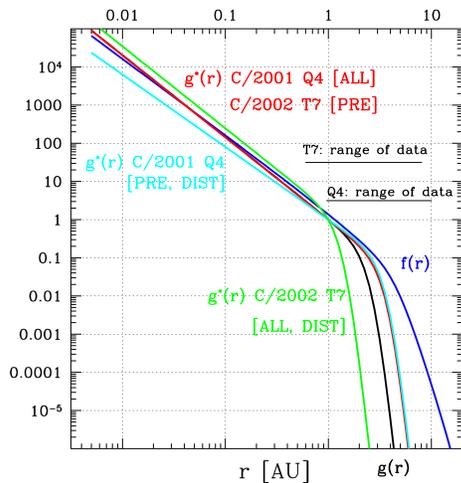


Illustration 1: Different forms of NG function $h(r)$ vs. heliocentric distance. Standard $g(r)$ are shown by black curve, Yabushita function $f(r)$ by blue. Green, cyan, and red curves represent the best derived estimates of the $g^(r)$ -like functions for Q4 and T7 for three types of data sets (ALL, PRE and DIST).*

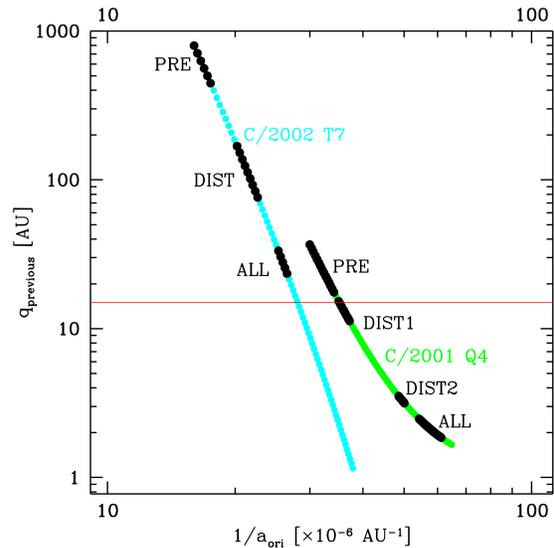


Illustration 2: Relations of previous perihelion distance vs original semimajor axis for Q4 (green curve) and T7 (blue). Four (three) black parts of Q4 (T7) curve show ranges of values determined in four (three) investigated types of data sets. Each black curve includes three types of NG models.

Ill. 2 shows that different forms of NG acceleration analyzed for these two comets much less change the value of $1/a_{ori}$ and the previous perihelion distance than the type of data subsets.

We concluded that in the case of T7 there is no doubt that this comet is dynamically new. We argued that for Q4 the best model seems that based on DIST2 data. According to this model comet Q4 has been inside the inner part of the solar system in the previous perihelion passage.

References: [1] Królikowska M and Dybczyński P.A. (2010) *MNRAS*, 404, 1886-1902. [2] Marsden B.G., Sekanina Z. and Yeomans D.K. (1973) *AJ*, 78, 211-225. [3] Yabushita S. (1996) *MNRAS*, 283, 347-352. [4] Combi M.R., Mäkinen J.T.T., Bertaux J.-L., Quémerais E. (2009) *AJ*, 137, 4734-4743.

Supported by MNiSW Grant: 181/N-HSO/2008/0.