

# C/2002 VQ94 (LINEAR) and 29P/Schwassmann- Wachmann 1 - $CO^+$ and $N_2^+$ rich comets

Aleksandra Ivanova<sup>1</sup>, Pavlo Korsun<sup>1</sup> and Viktor Afanasiev<sup>2</sup>

<sup>1</sup>MAO of NASU,  
email: [sandra@mao.kiev.ua](mailto:sandra@mao.kiev.ua)

<sup>2</sup>SAO of RAS

**Abstract.** We investigated comets active at large heliocentric distances using observations obtained at the 6-m BTA telescope (SAO RAS, Russia). Long-slit and photometric modes of the focal reducer SCORPIO were used. Two of the comets, 29P/Schwassmann-Wachmann 1 (SW1) and C/2002 VQ94 (LINEAR) were observed to be emission rich. Detection of  $CO^+$  and  $N_2^+$  emissions in the comae of these comets is evidence that they were formed in the outer regions of the Solar System or in a pre-solar interstellar cloud in a low temperature environment with  $T \sim 25K$ . The ratio of  $N_2^+/CO^+$  is equal to 0.011 and 0.027 for SW1 and LINEAR, respectively. Comet LINEAR is the most distant object in the Solar System (7.332 AU) for which  $CO^+$  and  $N_2^+$  are measured. The photometric maximum of the isolated  $CO^+$  coma in comet LINEAR is shifted by 1.4 arcsec ( $7.44 \times 10^3$  km) relative to the photometric maximum of the dust coma. This shift deviates from the sunward direction by 63 degrees.

---