

# PREDICTIONS ABOUT 2I/BORISOV (C/2019 Q4) APPEARANCE FROM 1I/ʻOUMUAMUA OBSERVED FEATURES

## ABSTRACT

The first undoubted interstellar minor body observed in inner Solar System showed several unexpected features can be explained by a long journey along Solar System immersed in an abrasive medium. The recently observed second undoubted interstellar origin comet 2I Borisov is travelling similar journey. Thus we can predict changes in comet appearance.

## INTRODUCTION

Gennady Borisov was discovery a comet on 30 August 2019 that received a provisional label gb00234 and later C/2019 Q4 (hereafter 2I/Borisov). Early astrometric data show strong hyperbolic orbit reported by Piotr Guzik et al. (2019)<sup>1</sup>. Its huge eccentricity of 3.14 and perihelion distance about 2 au imply a hyperbolic excess speed near 30 km s<sup>-1</sup>, closest value estimated for 1I/Oumuamua. This confirms interstellar origin of this body.

On 2017 1I/Oumuamua was showed several unexpected features and its appearance was different of cometary character supposed in most of bodies ejected of planetary system to interstellar space. The paper Jose J. Astorkia (2018)<sup>2</sup>, (hereafter, paper 1) and references therein shows that these features are congruent with changes of an initially cometary body during a long journey to inner planetary system in an weak abrasive environment. The prolonged high speed during centuries, in the same order that all comets during active periods, enhance effects and changes that are weaker and not observed in comet although are present.

This paper aim is not review suggested scenario working or its plausibility. This new body had experienced same travel in same environment at similar speed, thus we can expect changes that can be not similar due size difference even we will suppose similar composition. The aim of this paper is predict changes in 2I/Borisov in this scenario for compare to near future observations and scholastic expectations.

## SIZE

Today nucleus size estimation go from 0.5 km radius, Piotr Guzik et al. (2019)<sup>1</sup>, to 8 km radius in Siraj & Loeb (2019)<sup>3</sup>, and is based on an averaged magnitude contribution of 25% from nucleus observed in solar system comets. But the long journey in an weak abrasive medium has heated and become active comet early and today is volatile depleted and regolite lacking thus lesser active than a comet of same size. Coma contribution to comet luminosity is minimum and we must expect low albedo, like 1I/Oumuamua, then size is upper than first estimations. I consider that radius is upper than 20 km is an conservative and more accurate prediction.

## **SHAPE**

The extreme shape of 1I 'Oumuamua is caused by abrasión how is explained in paper 1 and references therein. At that case need around 35 meter layer abrasión from an inicial body a few hundreds meter size with initial elongation upper than 2. We can suppose that abrasión must be similar for 2I Borisov. Isotropically abrasión of 35 meter layer of an initially kilometer sized body leave body with minimal relative changes in dimensions and well conserving initial shape, that we must expect be common, not so extreme.

## **COMA**

Due weak activity cited above we can expect weak, unresolved coma. The observed coma is an misinterpretation and is really observation of tail in very close angle phase between tail axe and sightline. Further observations can confirm this scenario because increment in cited phase angle will results in unresolved coma with apparent disappearance.

## **TAIL**

Above noted weak activity point to short visible tail. Comets high velocity and little trajectory angle change during its posible observation period mean that orientation will still consistently aligned with negative velocity direction all time, including outbound leg. In this case is impossible invoke recurrent unbelievable explanation like a trail.

## **ACTIVITY EVOLUTION**

This comet is yet near perihelion thus velocity suffer slight increase that suppose slight activity increase too. Due perihelion long distance, 2 AU, we can not expect that activity be helped by Sun heating. But we can expect anomalous evolution of luminosity fading of comet along outbound trajectory. It will maintains near constant due relative little change in velocity between observable ranges, clearly less stepper than any other comet.

## **NON GRAVITATIONAL ACCELERATION**

1I 'Oumuamua was showed an sensible non gravitational acceleration. It was misinterpreted and orientated in opposite direction thus reported value is unfeasible but sure remain little value. With more than 200 times bigger radius and similar speed in proposed resistant medium in 2I Borisov exist non gravitational acceleration, but more than 200 times smaller, thus insensitive.

## **CONCLUSIONS**

Another surface orography features will be unobservable and are out of this paper scope.

We must wait for improved observations for valuation of presented predictions. Noted that some concerning evolution in time and need multiple observations.

## **REFERENCES**

1. Guzik P., et al. Interstellar comet 2I/Borisov Arxiv: 1909.05851 (2019)
2. Jose J. Astorkia, On Anomalous Acceleration, Atypical Shape and Others Unexpected Features of First Detected Interstellar Interloper 'OUMUAMUA, Vixra: 1811.0040 (2018)
3. Amir Siraj and Abraham Loeb. An Argument for a Kilometer-Scale Nucleus of C/2019 Q4, Arxiv: 1909.07286 (2019)