Observations of the comet 153P/Ikeya-Zhang and the taking, prozessing and analysis of the photographs taken of it with theoretical reflections

The fascination with the "dirty snowballs" from the astronomy lessons was decisive for the subject of my treatise which was part of my required final exam paper and which I now worked on anew. When I selected this topic, I didn't know anything of the fast brightly growing comet C/2002 C1 Ikeya-Zhang which was discovered in February 2002. As a long-period comet it was later named 153P/Ikeya-Zhang. I observed this comet at the school observatory of the secondary school in Heerbrugg (Switzerland) from March 2002 to evaluate the resulting pictures afterwards.

The photographs of the comet, of it 325 useful, I took with the support of my former astronomy teacher Mr. Benedikt Götz with a CCD-camera ST-10E on a 40cm-telescope Meade LX-200.

I set myself the task to observe the comet Ikeya-Zhang over a longer time period in order to document its activity and to search for structures in the coma which give information about active regions on the cometary nucleus and its rotation movement. In addition I examined the coma diameter as well as the speed, the coma's condensation degree, the tail's orientation and different structures in the coma which I also compared to CCD-photographs of the Wendelstein-observatory (Germany).

Due to the size of the CCD image field of 8' on 12' (curve minutes) I only photographed the inner coma. Therefore I complemented the CCD-photos with 45 slide-photographs which I shot using the tracking of the mobile school observatory telescope Celestron C8 and the camera OM2, in order to get the whole comet on the picture and to be able to document the tail's length, as well as the tail's orientation.

The investigation of the individual days resulted in the following interesting extracts from the results:

The tail appeared on the 1st April 2002 with a length of more than 6°. In addition, I was very often able to recognize tail rays (so-called streamers). They develop if the dust rate production changes regularly during 1-2 days. Therefore brightness variations of the structures in the dust tail become visible. In addition, I followed a streamer on the 13th March 02 which dissolved and disappeared. This Streamer clearly showed me that the tail doesn't rest, but is dynamic and can change very fast.

I discovered jets (gas or dust fountains), the consequence of eruptions of gas and dust on the surface of the comet nucleus, on the 30th April and on the 10th May in the inner coma on the MONICA-photographs (CCD-photos of the Wendelstein-observatory) taken with the CN filter. Then I tried to calculate the rotation duration through the movement of the jet and got for the 10th May a rotation duration of 4.7 hours. But I couldn't confirm this yet and thus it is only a assumption. This is also not easy, because comets often have more than one axis of rotation.

I identified the complete shadow on the 18th March 02 as well as on the 25th and 27th in my pictures. A complete shadow is visible if the "false nucleus", the compression around the nucleus consisting of a lot of dust particles, is lit up by the sun and it develops a conical shadow behind the "false nucleus". Thus, the particles in this shadow are not lit anymore and this complete shadow is recognizable as a dark area in the comet's tail.

Also different structures as e.g. envelopes (27th March) and spiral structures caused by jets (13th March and 29th March) were recognizable.

The comet Ikeya-Zhang got then in about June 2002 darker and it became more difficult to find him and finally he disappeared again in the depths of the universe and will only return again to your solar system after more than 300 years.

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Summary — Observations of the comet 153P/Ikeya-Zhang – Paper by Barbara Burtscher, Bahnhofstrasse 73, CH- 9450 Altstätten (SG), age-group 1985