

# Meteoroids 2013

26-30 Aug. 2013, Poznań, Poland

## Conference Program – Oral Contributions

### Sunday, August 25

16:00-20:00 **Reception desk opens**



Conference reception and all sessions will take place at the Collegium Minus of A.M. University, Wieniawskiego 1 str.

### Monday, August 26

8:00 - 9:00 **Registration**  
 8:30 - 9:00 Morning speakers upload and check presentations  
 9:00 – 9:20 **Opening event**  
 9:20 – 9:30 Organizational remarks

#### Session 1. Chelyabinsk superbolide

Chair: **Williams I.P.**

- 9:30+30 1.1. The Chelyabinsk superbolide of February 15, 2013.  
**Borovička J.**, Spurný P. (Invited). [001]
- 10:00+20 1.2. Chelyabinsk meteorite: Expedition to the field.  
**Kartashova A.**, Popova O., Jenniskens P., Emel'yanenko V., Dudorov A., Khaibrakhmanov S., Biryukov E., Glazachev D., Trubetskaya I. [037]
- 10:20+20 1.3. Chelyabinsk meteoroid entry and airburst damage.  
**Popova O.**, Jenniskens P., Shuvalov V., Emel'yanenko V., Rybnov Y., Kharlamov V., Kartashova A., Biryukov E., Khaibrakhmanov S., Glazachev D., Trubetskaya I. [052]
- 10:40+20 1.4. Chelyabinsk Meteorite: NEO/Meteorite Associations and the Origin in the Main-belt.  
**Abe S.** [019]
- 11:00 - 11:30 Coffee break
- 11:30+30 1.5. The Chelyabinsk Airburst: Energy estimates and airblast analysis.  
**Brown P.** (Invited). [002]
- 12:00+20 1.6. Studying ablation of the Chelyabinsk superbolide using a Runge-Kutta algorithm.  
**Dergham J.**, and Trigo-Rodríguez J.M. [028]

12:20 – 13:50 Lunch

13:30 - 13:50 Afternoon speakers upload and check presentations

## Session 2. Meteorite falls

Chair: **Porubcan V.**

13:50+30 2.1. Invited review of recent documented meteorite falls  
**Jenniskens P.M.** (Invited). [004]

14:20+20 2.2. Meteorite dropping Geminid recorded.  
**Spurný P., Borovička J.** [061]

14:40+20 2.3. The meteorite Moss – a rare carbonaceous chondrite.  
**Bilet M. and Roaldset E.** [054]

15:00+20 2.4. New Mars Meteorite Fall In Morocco: Collecting Observations And Spatial Distribution In The Strewnfield.  
**Ibhi A.** [034]

15:20 - 15:50 Coffee break

15:50+20 2.5. Oborniki (Wargowo) 2012 possible space debris fall  
**Nowak M., Gołębiewska J., Muszyński A., Wnuk E.** [045]

## Session 3. Historical records: bolides, meteors, meteorites

Chair: **Roaldset E.**

16:10+30 3.1. Meteor showers in the ancient Maya Hieroglyphic codices.  
**Kinsman H.** (Invited). [006]

16:40+20 3.2. The historical and geological data of extraterrestrial matter fall in Great Poland Lowland.  
**Stankowski W.** [062]

17:00+20 3.3. Documentation Of 250 Fireballs Observed In Norway About Hundred Years Ago.  
**Skorve J.** [060]

## Session 4. International Meteor Organisation

Chair: **Roaldset E.**

17:20+30 4.1. Status and history of the IMO Video Meteor Database.  
**Molau S.** (Invited). [008]

## Session 11. International Meteor Organisation

Chair: **Roaldset E.**

17:50+20 11.1 The IAU MDC - meteor showers database , current status.  
**Jopek T.J., Kanuchová Z.** [036]

18:10 – 20:00 Welcome party

## Tuesday, August 27

8:00-9:00      **Registration**

8:30 - 9:00      Morning speakers upload and check presentations

9:00 – 9:30      **Poster session**

### Session 5      **Physical properties of meteoroids micrometeorites and dust**

Chair: **Popova O. and Koschny D.**

9:30+30      5.1. Working with the fractal nature of a chondritic solar composition in studies of meteoric materials.

**Rietmeijer F.** (Invited). [011]

10:00+20      5.2. Sampling of the constant drizzle of meteoric dust in the upper stratosphere.

**Rietmeijer F.** [053]

10:20+20      5.3. Raman Microspectroscopy of particles RA-QD02-0158, RA-QD02-0187 and RA-QD02-0197 collected by the HAYABUSA sample return mission to Itokawa asteroid.

**Pavlov S.G.**, Alwmark C., Bajt S., Böttger U., Busemann H., Gilmour J.D., Heitmann U., Hübers H.-W., Meier M.M.M., Schade U., Spring N.H., Weber I. [048]

10:40+20      5.4. Changes to meteoroid shape, porosity and internal structure during high velocity atmospheric entry.

**Kohout T.**, Kallonen A, Suuronen J.-P., Rochette P., Hutzler A., Gattacceca J., Badjukov D.D., Skála R., Čuda J. [040]

11:00 - 11:30      **Coffee break**

11:30+30      5.5. The cosmic dust input to the earth's atmosphere: how large is it?

**Plane J.M.C.** (Invited). [010]

12:00+20      5.6. Solid Hydrogen and Micrometeors of Interstellar Origin.

**Walker M.A.** [067]

12:20+20      5.7. Radar observations during the ECOMA campaign on the Geminids 2010.

**Stober G.**, Schult C., Baumann C., Dunker T., Hoppe U.-P., Latteck R., Rapp M., Keuer D. [063]

12:40 – 14:10      **Lunch**

13:40 - 14:10      Afternoon speakers upload and check presentations

14:10+30      5.8. Density of small meteoroids.

**Kikwaya J.B.** (Invited). [005]

14:40+20      5.9. The MEMIN Research Unit: laboratory impact cratering experiments into geological materials (sandstone, quartzite, tuff).

**Deutsch A.**, Kenkmann T., Poelchau M.H., Thoma K. [029]

**Session 6 Meteor spectra**Chair: **Borovička J.**,

15:00+30 6.1. Emission spectroscopy: clues on the continuous volatile delivery from cometary meteoroids.  
**Trigo-Rodriguez J.M.** (Invited). [014]

15:30+20 6.2. Development of a Spectroscopic Survey of Meteoroid Elemental Abundances  
Jenniskens P.M., **Gural P.**, Berdeu A. [031]

15:50 - 16:20 Coffee break

16:20+20 6.3. Is a 2004 Leonid meteor spectrum captured in a 182 cm telescope?  
**Kasuga T.**, Iijima T., Watanabe J. [038]

16:40+20 6.4 Automated High-Resolution Spectral Meteor Camera.  
Oswald W. and Campbell-Brown M.D. [047]

**Session 7 Meteoroid streams: modeling, forecasting, parent bodies**Chair: **Kikwaya J.B.**

17:00+30 7.1. Modelling Meteoroid Streams in the Solar System.  
**Soja R.H.**, Gruen E., Srama R., Sterken V.J., Strub P., Vaubaillon J., Krueger H. (Invited). [013]

17:30+20 7.2. Dynamical Modelling of Meteoroid Streams.  
**Clark D.**, Wiegert P. [026]

## Wednesday, August 28

8:30 - 9:00 Morning speakers upload and check presentations

9:00 – 9:30 **Poster session**

### Session 7 Meteoroid streams: modeling, forecasting, parent bodies (Follow up)

Chair: **Pellinen-Wannberg A. and Jenniskens P.M.**

9:30+30 7.3. The dynamics of meteoroid streams in the Solar System and the forecasting of meteor showers.

**Vaubaillon J.** (Invited). [015]

10:00+20 7.4. The meteor showers of cometary asteroid (192642) 1999 RD32.

**Christou A.A.**, Vaubaillon J. [025]

10:20+20 7.5. Recent discovery of few parent bodies: a review.

**Rudawska R.**, Vaubaillon J. [055]

10:40+20 7.6. Forecast of Enhanced Activity of Eta-Aquariids in 2013.

**Sato M.**, Watanabe J. [057]

11:00 – 11:30 Coffee break

11:30+20 7.7. The ecliptic-toroidal structure of the meteor complex of comet 96P/Machholz.

**Neslušan L.**, Kanuchova Z., Tomko D. [046]

11:50+20 7.8. Saturnian resonances in meteor streams.

**Sekhar A.**, Asher D. [058]

12:10 – 13:40 Lunch

13:10 - 13:40 Afternoon speakers upload and check presentations

### Session 8 Dust and meteoroids dynamics

Chair: **Spurný P.**

13:40+30 8.1. Dynamical Model for the Zodiacal Cloud and Sporadic Meteors

**Nesvorný D.** (Invited). [009]

14:10+20 8.2. The rotation of cometary meteoroids.

**Čapek D.** [024]

14:30+20 8.3. Öpik-type collision probability for high-inclination orbits: Targets on eccentric orbits

**Pokorný P.**, Vokrouhlický D. [051]

14:50+20 8.4. A new model describing the orbits and absolute magnitudes of near-Earth objects.

**Granvik M.**, Morbidelli A., Jedicke R., Bolin B., Bottke W.F., Beshore E., Vokrouhlický D., Nesvorný D. and Michel P. [030]

16:30-19:00 Excursions 1 and 2

19:00- X Banquet

## Thursday, August 29

8:30 - 9:00 Morning speakers upload and check presentations

9:00 – 9:30 **Poster session**

### Session 9 Meteoroid streams and populations

Chair: **Watanabe J. Asher D.**

9:30+30 **9.1.** Stream and sporadic meteoroids associated with Near Earth Objects.  
**Williams I.P.**, Jopek T.J. (Invited). [018]

10:00+20 **9.2.** The Capricornids asteroid-meteoroid complex.  
**Kokhirova G.I.**, Babadzhanov P.B., Khamroev U.Kh. [041]

10:20+20 **9.3.** Summary of results of 2011 Draconid aircraft mission.  
**Koten P.**, Vaubaillon J., Rudawska R., Tóth J., Margonis A., Gritsevich M. [043]

10:40+20 **9.4.** 60 years of the Geminid meteoroid stream modelling.  
**Ryabova G.O.** [056]

11:00 - 11:30 Coffee break

11:30+20 **9.5.** On the Age and Formation of the Quadrantid Meteoroid Stream.  
**Abedin A.**, Spurný P., Wiegert P., Borovička J., Brown P. [020]

11:50+20 **9.6.** Radar observations of the Daytime Arietid meteor shower by the Canadian Meteor Orbit Radar.  
**Bruzzone S.**, Brown P., Weryk R.J., Wong D.K. [022]

12:10+20 **9.7.** An enhanced survey for meteor shower outbursts using the Canadian Meteor Orbit Radar (CMOR).  
**Brown P.**, Weryk R.J., Wong D.K. [021]

12:30 – 14:00 Lunch

13:30 - 14:00 Afternoon speakers upload and check presentations

### Session 10 Observation techniques, data reductions, methods

Chair: **Ryabova G.O. and Rietmeijer F.**

14:00+30 **10.1.** The Canadian Automated Meteor Observatory.  
**Campbell-Brown M.D.**, Brown P., Weryk R., Wiegert P. (Invited). [003]

14:30+20 **10.2.** Meteor observations with the next generation geospace radar EISCAT 3D.  
**Kero J.** [039]

14:50+20 **10.3.** The Southern Argentina Agile Meteor Radar (SAAMER): A platform for comprehensive meteor observations and studies  
**Janches D.** [035]

15:10+20 **10.4.** BRAMS: a Belgian radio forward scatter network to study meteors.  
**Lamy H.**, Ranvier S., Gamby E., Calders S., Anciaux M., De Keyser J. [044]

15:30 - 16:00 Coffee break

- 16:00+20 10.5. Automatic Detection of Asteroid and Meteoroids - Wide Fields Survey.  
**Tóth J.**, Vereš J.P., Jedicke R., Tonry J., Denneau L., Wainscoat R., Kornoš L., Šilha J. [066]
- 16:20+20 10.6. Correction Effect to the Radiant Dispersion in case of Low Velocity Meteor Showers.  
**Watanabe J.**, Sato M. [068]
- 16:40+20 10.7. Transverse motion of fragmenting faint meteors observed with the Canadian Automated Meteor Observatory.  
**Stokan E.**, Campbell-Brown M.D. [064]
- 17:00+20 10.8. A new software application for all sky camera networks.  
**Peterson Ch. L.** [050]
- 17:20+20 10.9 High resolution Video and Light Curve analysis of Meteors.  
**Subasinghe D.**, Campbell-Brown M. [065]

## Friday, August 30

8:30 - 9:00 Morning speakers upload and check presentations

**9:00 – 9:30 Poster session**

### Session 11 Meteor databases, Follow up.

Chair: **Campbell-Brown M.D.**

**9:30+30** 11.2. Using the Virtual Meteor Observatory – Geminids 2011.  
**Koschny D.**, Smit H., Barentsen G. (Invited). [007]

10:00+20 11.3. Hyperbolic orbits in the EDMOND,  
**Hajduková M. Jr.**, Kornoš L., Tóth J. [032]

10:20+20 11.4. Confirmation and characterization of meteor showers from IAU working list.  
**Kornoš L.**, Matlovič P., Tóth J., Koukal J., Piffel R. and EDMOND consortium [042]

### Session 12 Fireballs

Chair: **Svoren J**

**10:40+30** 12.1. Physical properties of meteor shower fireballs.  
**Shrbený P.**, Spurný P. (Invited). [012]

**11:10 - 11:40** Coffee break

**11:40+30** 12.2. Jovian Impact Flashes and their Implication to Meteoroids in Outer Region of Solar System.  
**Watanabe J.** (Invited). [016]

12:10+20 12.3. Simultaneous Infrasonic and Optical observations of bright meteors: analysis of acoustic source heights and signal classification.  
**Silber E.A.**, Brown P. [059]

**12:30 – 13:30** Lunch

13:00 - 13:30 Afternoon speakers upload and check presentations

13:30+20 12.3 The NASA Fireball Network  
**Cook. W.** [027]

### Session 13 Meteoroid interactions with the planetary atmospheres

Chair: **Kanuchova Z.**

**13:50+30** 13.1 Insights into meteoroid ablation from simultaneous radar-video observations.  
**Weryk R.J.**, Brown P.G. (Invited). [017]

14:20+20 13.2. Implications for meteoroid structure and ablation from multiple maxima meteor light curves.  
**Hawkes R.L.** Roberts I.D., Weryk R.J., Campbell-Brown M.D., Brown P.G., Stokan E. [033]



- 14:40+20 13.3. Modeling of meteoroids at high resolution.  
**Campbell-Brown M.D.**, Borovička J., Brown P., Stokan E. [023]
- 15:00+20 13.4. Collective E-region ionisation caused by the 1767 trail during the 2002 Leonids.  
**Pellinen-Wannberg A.**, Häggström I. Westman A. [049]

15:20 – 15:50 **Conference Summary**

# Meteoroids 2013

26-30 Aug. 2013, Poznań, Poland

## Poster Program

Posters will be presented from 26 Aug. afternoon until 30 Aug. afternoon at the Lubrański Hall next to the conference lecture hall, Collegium Minus UAM.

All authors are asked to put their posters up on the poster boards on **Monday 26, Aug.** during the lunch time. The posters should be taken off, at the latest on **Friday 30, Aug.** during the lunch time.

### Tuesday 27 Aug. - Wednesday 28 Aug.

Each day the poster sessions lasts from at 9:00-9:30. Within this interval, the presenting authors are kindly asked to be present near their posters.

#### Session P1. Chelyabinsk superbolide

- P1.1 The Chelyabinsk bolide as a prove of cometary nature of Earth orbit crossing bodies.  
**Bagrov A.V.**, Leonov V.A., Popelenskaya N.V. [070]
- P1.2 Physics of the Chelyabinsk fireball.  
**Churyumov K.I.**, Kruchynenko V.G., Mozgova A.M. [078]
- P1.3 Chelyabinsk Superbolide: a detailed analysis of the passage through the atmosphere and orbit determination.  
**Włodarczyk K.**, Włodarczyk I. [125]
- P1.4 Chelyabinsk meteorite: eye witnesses interviews.  
**Kartashova A.**, Popova O., Jenniskens P., Korotkiy S., Emel'yanenko V., Dudorov A., Khaibrakhmanov S., Biryukov E., Glazachev D., Trubetskaya I., Serdyuk I. [091]

#### Session P2. Meteorite falls

- P2.1 Meteorites of Turkie.  
**Caliskan O.** [074]

#### Session P3. Meteor flux

- P3.1 Meteoroid stream flux profiles derived from the IMO Video Meteor Network.  
**Barentsen G.**, Molau S. [071]

#### Session P5. Physical properties of meteoroids micro-meteoroids and dust

- P5.1 Chemistry of Benešov meteoroid.  
Berezhnoy A.A., **Borovička J.** [072]

- P5.2 On the chemical and mineral composition of the par"Turys Remety" in Transcarpathian.  
**Churyumov K.I.**, Belevtsev R.Y., Spivak S.D. [079]
- P5.3 Micro-Raman spectroscopy of meteorite Kosice  
**Kanuchová Z.**, Baratta G.A. [090]

### Session P6. Meteor spectra

- P6.1 Spectroscopy of the 2012 Geminids from AGM Marrakech observatory.  
**Daassou A.**, Ait Moulay Larbi M., Rudawska R., Benkhaldoun Z., Baratoux D., Vaubaillon J., Bouley S. [080]
- P6.2 Spectroscopic airborne observations of the 2011 Draconids meteor shower outburst.  
**Rudawska R.**, Zender J., Jenniskens P., Borovicka J., Vaubaillon J., KotenP., Koschny D., McAuliffe J. [107]
- P6.3 Emission spectrum of a sporadic fireball afterglow.  
Madiedo J.M., **Trigo-Rodriguez J.M.** [117]

### Session P7 Meteoroid streams: modeling, forecasting, parent bodies

- P7.1 Comets outbursts and the meteor showers.  
**Guliev A.S.**, Kokhirova G.I., Poladova U.D. [083]
- P7.3 Presentation canceled. [096]
- P7.4 Prediction of meteor shower of comet 161P/2004 V2.  
**Tomko D.**, Neslušan L. [114]
- P7.5 2014 CAMELOP Airborne campaign preparation  
Berard D., **Vaubaillon J.** [118]

### Session P11 Meteor catalogues and databases

- P11.1 Catalogue of meteoroid orbits with large eccentricities from the KhNURE database of radar observations in Kharkiv.  
**Kolomiyets S.V.**, Voloshchuk Yu.I. [093]
- P11.2 Photographic IAU MDC Meteor Database - Version 2013.  
Neslušan L., **Porubčan V.**, Svoreň J. [101]

**Thursday 29 Aug. - Friday 30 Aug.**

Each day the poster sessions lasts from at 9:00-9:30. Within this interval, the presenting authors are kindly asked to be present near their posters.

**Session P9 Meteoroid streams and populations**

- P9.1 A Parent Body Search Across Several Video Meteor Data Bases.  
Šegon D., **Gural P.**, Andreic Ž., Skokic I., Korlevic K., Vida D., Novoselnik F. [084]
- P9.2 The Geminids' orbital dispersion derived from the European video meteor network database.  
**Hajdukova M., Jr** [085]
- P9.3 The distribution of the orbits within the meteor streams from the SonotaCo shower catalogue.  
**Hajdukova M., Jr** [086]
- P9.4 An initial meteoroid stream survey in the southern hemisphere using the Southern Argentina Agile Meteor Radar (SAAMER).  
**Janches D.**, Hormaechea J.L. , Brunini ., Hocking W., Fritts D.C. [088]
- P9.5 The 2011 Draconids Airborne Observation Campaign: First results using the SPOSH camera.  
**Margonis A.**, Koschny D., Toth J., Koten P., Vaubaillon J., Oberst J., Zender J., Mc Auliffe J. [095]
- P9.6 Video observations of the Geminids meteor shower in 2012 from Morocco.  
**Ait Moulay Larbi M.**, Daassou A., Benkhaldoun Z., Rudawska R., Baratoux D. [097]
- P9.7 Physical and kinematic characteristics of meteoroids producing bright radio meteors  
**Narziev M.** [098]
- P9.8 Taurid Meteor Complex.  
Buček M., **Porubčan V.** [100]
- P9.9 CMOR Observations of the 2011–2012 October Draconid Outbursts.  
**Ye Q.-Z.**, Brown P. G., P. Wiegert A., Campbell-Brown M.D., Weryk R. J. [102]
- P9.10 New meteor showers identified in the CAMS and SonotaCo meteor databases.  
**Rudawska R.**, Jenniskens P. [106]
- P9.11 Observation of October Draconids 2011 in Maidanak Observatory and Study of its Peak time.  
**Sato M.**, Watanabe J., Ohkawa T. [108]
- P9.12 Taurids in the IAU MDC Database  
Kanuchova Z., **Svoreň J.** [113]
- P9.13 Video observation of unexpected outburst Draconids 2012.  
**Tóth J.**, Koukal J., Kornoš L., Piffl R., Gajdoš Š. and EDMOND and EDMOND consortium [116]

**Session P10. Observation techniques, data reductions, methods**

- P10.1 On the standardization of photometric results of meteor registrations processing.  
**Bagrov A.V.**, Leonov V.A. [069]

- P10.2 Radar detectability studies of slow and small Zodiacal Cloud Dust Particles.  
**Janches D.**, Plane J.M.C., Feng W. , Sanchez-Carrillo J.D., Nicolls M.J., Nesvorny , Marsh D. [087]
- P10.3 The MU radar meteor head echo database.  
**Kero J.**, Szasz C., Nakamura T., Terasawa T., Nishimura K., Tsutsumi M., Fujiwara Y., Ueda M., Watanabe J., Abe S., Abo M., Tanaka Y., Yamamoto M. [092]
- P10.4 Theory and practice of low light TV meteors photometry: an empirical approach.  
**Kozak P.M.** [094]
- P10.5 Meteor detection in wide-field survey telescopes.  
**Ocaña F.**, Ponz J.D., Zamorano J. [099]
- P10.6 Radio Polarisation Measurements of Meteor Trail Echoes with BRAMS.  
**Ranvier S.**, Lamy H., Anciaux M., De Keyser J., Calders S., Gamby E. [103]
- P10.7 Evidence for a VLF propagation perturbation associated with a meteor.  
**Rault J-L.** [104]
- P10.8 The Norwegian Meteor Network.  
**Roaldset E.** [105]
- P10.9 Present state of the MAARSY meteor head echo analysis  
**Schult C.** , Stober G., Latteck R. [109]
- P10.10 Optical trail widths of faint meteors observed with the Canadian Automated Meteor Observatory.  
**Stokan E.**, Campbell-Brown M.D., Brown P.G., Hawkes R.L., Doubova M., Weryk R.J. [112]
- P10.11 Slovak Video Meteor Network - AMOS Cameras - coverage, precision and results.  
**Tóth J.**, Spurný P., Kornoš, L. Zigo P., Šilha J., Gajdoš Š., Galád A., Kalmančok., Šimon J., Mäsiar J. [115]
- P10.12 Meteoroid 3D-trajectory determination using FFT from shuttered image.  
Clovirola A., **Vaubailon J.** [119]
- P10.13 Faint Meteor Observation by Large-Format CMOS Sensor with 1.05-m Kiso Schmidt Telescope.  
**Watanabe J.**, Kasuga T., Terai T., Miyazaki S., Ohta K., Murooka F., Ohnishi T., Yamasaki T., Mito H., Aoki T., Soyano T., Tarusawa K., Matsunaga N., Sako S., Kobayashi N., Doi M. [121]
- P10.14 Determining meteor trail radii using the Canadian Meteor Orbit Radar (CMOR).  
**Weryk R.J.**, Brown P.G., Krzeminski Z., Stokan E. [122]
- P10.15 Taiwan Elegant Meteor and TLE Network (TWEET)  
**Wu B.-X.**, Abe S., Lin H.-C., Lin C-S. [127]

## Session P12 Fireballs

- P12.1 Three bright bolides in Kiev sky on 29 March 2013.  
**Churyumov K.I.**, Vidmachenko A.P, Steklov A.F., Steklov E.A. [077]
- P12.2 Bright Perseid fireball with exceptional beginning height observed by different techniques.  
Spurný P., Koten P., **Shrbený L.**, Vojáček V., Borovička J., Štokr R. [110]
- P12.3 Trajectory and orbit of the Maribo CM2 meteorite from optical, photoelectric and radar records.

**Spurný P.**, Borovička J., Haack H., Singer W., Jobse K., Keuer D. [111]

P12.4 PF191012 Myszyniec - highest Orionid meteor ever recorded.  
Olech A., Żołądek P., **Wiśniewski M.**, Pietkiewicz K., Maciejewski M., Tymiński Z.,  
Krzyżanowski T., Krasnowski M., Kwinta M., Myszkiewicz M., Polakowski K., Zaręba P. [123]

### Session P13 Meteoroid interactions with the planetary atmospheres

P13.1 Theoretical study of the ablation of Meteoroids in the upper atmospheres of Venus, Earth, Mars and Titan.  
**Carrillo-Sánchez J. D.**, O'D. Alexander C. M., Plane J. M. C. [075]

### Session P14 Diverse subjects

P14.1 Polarimetric study of CB56 and CB69 cloud.  
**Chakraborty A.** [076]

P14.2 Imaging Polarimetry of Comet C/2009 P1 Garradd.  
**Deb Roy P.**, Das H.S., Medhi B.J., Wolf S., Bertrang G., Chakraborty A. [081]

P14.3 Two mechanisms of the ejection of meteoroids from comets.  
**Gronkowski P.**, Wesołowski M. [082]

P14.4 Orbital Evolution and Impact Hazard of Asteroids on Retrograde Orbits.  
**Kankiewicz P.**, Włodarczyk I. [089]

P14.5 The potentially dangerous asteroid (99942) Apophis.  
**Włodarczyk I.** [126]

P14.6 Calculation of the MOID – new numerical method  
**Wiśniowski T.**, Rickman H. [124]

P14.7 Impact probability calculations by Hill sphere method.  
**Wajer P.**, Gabryszewski R. [120]

P14.8 Reliability of the orbital associations among the small bodies.  
**Bronikowska M.**, Jopek T.J. [073]