Tarik Zegmott

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Academic record

September 2015 to February 2021 - University of Kent, School of Physical Sciences, CAPS, Canterbury, United Kingdom

Awarded a three-year STFC PhD scholarship at the University of Kent. My research focuses on the physical characterisation of asteroids and the thermal response of their surfaces, specifically the direct detection of the asteroidal Yarkovsky-O'Keefe-Radzievskii-Paddack (YORP) effect. The YORP effect is a thermal torque induced by solar radiation re-radiated from the surface of the asteroid. The affect of this causes changes in spin state of the asteroid. Supervised by Dr. Stephen Lowry.

October 2011 to July 2015 - University of Southampton, Southampton, United Kingdom

Completed a four-year undergraduate course entitled "Astrophysics with A Year Abroad". I graduated in July 2015 with a first-class MPhys with Honours. A sample of the modules undertaken include Classical Mechanics, Cosmology and the Early Universe, Electromagnetism, Stellar Evolution, and Quantum Physics.

Training activities

November 2016 – IAC Canary Islands Winter School of Astrophysics

Attended a ten day residential winter school focusing on Solar System exploration. During which I received lectures and tutorials on topics including cometary science, the physical properties of asteroid surfaces, the origin and early evolution of the Solar System, and planetary atmospheres. I was also taught how to perform the reduction and analysis of asteroid spectra and how to search the Planetary Science Archive. At the school, I also presented a poster (see Presentations).

February 2016 – Observing run at the Isaac Newton Telescope

Collected data on several asteroids over the three nights, wherein I was fully trained on all aspects of operating the INT. I was involved with the planning of the asteroid observations and the preparation of the telescope proposal for this run.

December 2015 – ASTERICS VO School, Madrid, Spain

A three-day course where I was trained to use a variety of virtual observatory (VO) tools and services that are available today. These included Aladin, TOPCAT, Stilts, and Simbad. I developed an in depth knowledge of the VO tools and learnt how to query sky surveys and over plot star catalogues, also how to pass data between the various tools.

September 2014 to May 2015 - Harvard-Smithsonian Centre for Astrophysics, Cambridge, USA

Worked in collaboration with José-Luis Galache of the Minor Planet Centre and Martin Elvis of the Centre for Astrophysics, as part of my undergraduate, studying how many near-Earth asteroids can be characterised per year based on different telescope constraints, to describe how the constraints define strategies for characterising near-Earth objects in bulk.

April 2012 - University of La Laguna, Tenerife, Spain

Worked in a design collaboration between La Laguna University and Southampton University. Responsible for designing the detector of a high-energy space mission.

April 2012 - Instituto de Astrofísica de Canarias, Tenerife, Spain

Worked with students from the University of Southampton to gather observational data from the IAC80 and MONS telescopes. Used data collected on the Whirlpool Galaxy to calculate the current star formation rate.

Computer Skills

- Familiar with Python, IRAF, Matlab, IDL, bash, & awk.
- Good knowledge of Windows, Unix, and Mac OS.

Experience

September 2017 to September 2018 – Support Astronomer, Issac Newton Group of Telescopes

Assisted in the daily operation of the 2.5 metre Issac Newton Telescope located on the island of La Palma, Spain. During my term at the telescope, I learnt about all aspects of its operation. My duties involved configuring and calibrating both instruments: the Wide Field Camera and the Intermediate Dispersion Spectrograph, performing service-mode observations, and ensuring the smooth operation of the telescope during visitor-mode observations.

January 2017 to December 2020 – Physical Sciences Demonstrator

Taught the module titled "Data Analysis Techniques in Astronomy and Planetary Science", which is a second year undergraduate laboratory module. In this role I worked with Prof. Stephen Lowry to teach undergraduate students how to use virtual observatory tools; how to perform astrometry, photometry, and spectroscopy; and image enhancement techniques.

January 2016 to December 2020 – Beacon Observatory Support

Provided support to observing on the telescope, and I am part of the users committee on the Beacon Observatory at the University of Kent. This is a 17" telescope mounted on a german equatorial mount. Roles include helping to develop and maintain the observatory user's operational manual, training new observers, and demonstrating observations for undergraduate/masters project students. Observations involve planning the order of targets for the night and obtaining all bias, flats and sciences frames; usual targets included asteroids, using the differential tracking system, and variable stars in young star clusters.

October 2015 to December 2020 – Physical Sciences Outreach Officer

Delivered physical science outreach sessions to all levels of education institutions up to higher education. Experience gained in demonstrating an Asteroid Workshop that I helped develop. The workshop contains experiments designed to teach secondary school pupils the principals of obtaining an asteroid's light curve using photometry. I also taught in the residential Space School the University of Kent ran, where I created and ran a project teaching the pupils how to reduce and analyse CCD images of asteroids.

October 2015 to 2018 - GRADnet Postgraduate Student Representative for the University of Kent

Represented the University of Kent on the GRADnet student panel. GRADnet is a branch of the South-East Physics Network (SEPnet), which is a consortium of nine universities in the south east of England. The panel discusses how to encourage its members to actively participate in the training events hosted by GRADnet and is a mechanism for students to provide feedback thorugh.

Presentations

June 2020 – The Open University, Buckinghamshire, UK – "Detection of the YORP effect on the contact-binary asteroid (68346) 2001 KZ66".

September 2019 – EPSC/DPS Conference, Geneva, Switzerland – Poster presentation – "Physical Characterisation of Near-Earth Asteroid (68346) 2001 KZ66 from Optical and Radar Observations".

July 2019 – Team Radar Conference, Houston, TX, USA – Oral presentation – "Physical Characterisation of Near-Earth Asteroid (68346) 2001 KZ66 from Optical and Radar Observations".

May 2017 – Centre for Astrophysics and Planetary Science, Kent, UK – Oral presentation – "Photometric detections of the asteroidal YORP effect".

November 2016 – Canary Islands Winter School, Tenerife, Spain – Poster presentation – "Search for YORP signatures on asteroid (29075) 1950 DA".

July 2016 – SEPnet Where Will My Physics Take Me, Herstmonceux, East Sussex, UK – Poster presentation – "Photometric detections of the YORP effect".

May 2015 – Havard-Smithsonian Center for Astrophysics, MA, USA – Oral presentation – "Optimising the observing strategy of near-Earth asteroid characterisation".

January 2015 – American Astronomical Society, Seattle, WA, USA – Poster presentation – "Gotta catch 'em all! Optimising near-Earth asteroid characterisation".

Publications

T.J. Zegmott et al. (in preparation), "First direct detection of a YORP 'spin-down': the case of (29075) 1950 DA ".

T.J. Zegmott et al., (**in preparation**), "Detection of the YORP Effect on the contact-binary (68346) 2001 KZ66 from combined radar and optical observations".

O. Vaduvescu et al. including T.J. Zegmott. New Astronomy, 2021, "Ready for EURONEAR NEA surveys using the NEARBY moving source detection platform".

M. Monguió et al. including T.J. Zegmott, Astronomy & Astrophysics, 2020, "IGAPS: the merged IPHAS and UVEX optical surveys of theNorthern Galactic Plane".

A. Rożek et al. including T.J. Zegmott, Astronomy & Astrophysics, 2019, "Shape model and spin-state analysis of PHA contact binary (85990) 1999 JV6 from combined radar and optical observations".

D. Froebrich et al. including T.J. Zegmott, Research Notes of the AAS, 2018, "Variability in IC5070: Two young stars with deep recurring eclipses".

D. Froebrich et al. including T.J. Zegmott, Monthly Notices of the Royal Astronomical Society, 2018, "A survey for variable young stars with small telescopes: First results from HOYS-CAPS".

A. Sicilia-Aguilar et al. including T. Zegmott, Astronomy & Astrophysics, 2017, "The 2014-2017 outburst of the young star ASASSN-13db: A very low-mass link between EXors and FUors".

D. Froebrich et al. including T.J. Zegmott, The Astronomer's Telegram, 2017, "Optical brightness and colours of V2492Cyg before, during and after the recent record peak in brightness".

C. Snodgrass el al. including T. J. Zegmott, Philosophical Transactions A, 2016, "The 67P/ Churyumov- Gerasimenko observation campaign in support of the Rosetta mission".

Public Outreach

July 2016/2018/2019 – University of Kent Space School – Designed and taught a workshop activity aimed at secondary school pupils about the treatment and analysis of telescope data, and the geology of asteroids and meteorites as part of a three-day residential school.

8th July 2016 – Royal Society: A Comet Revealed – Presented ground-breaking results from ESA's Rosetta mission to the general public at the Royal Society's seven-day Summer Science Exhibit. We shared how the instruments aboard the Rosetta orbiter and Philae lander have enabled leaps in our understanding.

2nd November 2015, 30th June 2016, 14th July 2016 – Local outreach – Designed and lead asteroid outreach session. Aim was give pupils an understanding of asteroidal light curves and what we can learn from them, in addition to how shape models are obtained from radar observations. This was given at several local schools.

Grants Awarded

September 2017 – Issac Newton Group Studentship – Awarded fully funded studentship for to become a support astronomer at the ING's 2.5 metre Isaac Newton Telescope, La Palma, Spain.

September 2016 – Royal Astronomical Society Small Grant Scheme – Awarded £610 for the attendance of the IAC Canary Island Winter School.

December 2015 – ASTERICS Virutal Observatory School – Secured full funding from the organisers to attend the school (see training activities for details of the school).

September 2015 – Science and Technology Facilities Council PhD Scholarship – Full funding to complete a PhD at the University of Kent.

Proposals

2019B - PI on OPTICON/Nordic Optical Telescope proposal — Physical Characterisation of the Near-Earth Asteroid (29075) 1950 DA and Detection of the YORP Effect. Proposal ID: 2019B044 - **Approved**

2019B - PI on Isaac Newton Telescope proposal — Physical Characterisation of the Near-Earth Asteroid (29075) 1950 DA. Proposal ID: I/2019B/12 - **Approved**

2019B - Co-I on Liverpool Telescope proposal — Direct Detections of the Asteroidal YORP Effect - Continued Photometric Monitoring. Proposal ID: PL19B17 - **Approved**

2018 - PI on INT Service proposal — Physical characterisation of the asteroids 1866 and 5626. Proposal ID: SI2018a06 - **Approved**

2018B - PI on Telescopio Nazionale Galileo proposal — Understanding the Thermal Response of Asteroid Surfaces via Detections of the YORP Effect. Proposal ID: 39-MULTIPLE-2/18B - **Declined**

2018B - Co-I on INT, Mercator, and LT proposal — Continuing the EURONEAR Lightcurve Survey of Near Earth Asteroids. Proposal ID: 9-MULTIPLE-3/18B - **Approved**

2017B - Co-I on Liverpool Telescope proposal — Direct Detections of the Asteroidal YORP Effect - Continued Photometric Monitoring. Proposal ID: PL17B19 - **Approved**

2015 to Present – CO-I on ESO Large Programme – Involved in the organisation and planning of the ESO large programme. Roles include planning of future targets, preparing telescope proposals, and obtaining data. Telescope used as part of this proposal is NTT and VISIR. Proposal ID: 197.C-0816 - **Approved**

2016A – CO-I on Isaac Newton Telescope proposal – Physical Characterisation of the Bilobate Near-Earth Asteroid (85990) 1999 JV6, and Detection of the YORP Effect. Proposal ID: I/2016A/10 - **Approved**