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Matthew Willson (1990–2022)

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Matthew Willson died tragically on Tuesday, January 26, 2022, in Atlanta Georgia. He was 31.

High angular resolution astronomy has suffered a great loss with the sudden death of Dr. Matthew Willson at age 31. Matthew was visiting his long-time girlfriend Katherine Shepard (a Ph.D. student in astronomy at Georgia State University in Atlanta) when he was struck by a stray gunshot that entered the apartment where he was staying. He died in hospital a few days later, on January 18, 2022. This premature end to the life of such a promising young scientist has devastated his many colleagues on both sides of the Atlantic.

Photo credit: unknown.

Matthew Willson was born in London on March 18, 1990. He loved the stars from his earliest years and, blessed with an amazing memory, he was on his way to a life of learning. He began his formal life in astrophysics as a student at Royal Holloway, University of London, in Surrey, just down the road from his childhood home (2008–2012). There he worked with Professor Stewart Boogert on the design, construction, and calibration of a spectrometer for use with the University 30 cm telescope. He led students on many cold evenings in teaching telescope use and wrestling equipment into operation for programs of photometry and spectroscopy.

After graduating with an M.Sci. degree, Matthew continued working with Professor Boogert on upgrading the teaching telescope for future students. During this period, he became a fully integrated member of the department, making friends with the other Ph.D. students and post-doctoral researchers alike. The accelerator physics and dark matter research groups particularly took Matthew under their collective wing, and Matthew maintained strong ties with the department long after his departure.

Matthew Willson entered the Ph.D. program at the University of Exeter in 2013 and embarked on a high spatial resolution imaging program to search for evidence of planet formation within evolved protoplanetary discs, working with Professor Stefan Kraus. He was a passionate observational astronomer, and he used a broad range of high-angular resolution imaging techniques to detect asymmetric disk structures caused by embedded exoplanets and to search for the direct emission of young planets. His observational work included sparse aperture masking interferometry with the Keck/NIRC2 and VLT/NACO instruments, together with spectral differential imaging observations with VLT/SPHERE-ZIMPOL. Matthew's Ph.D. work using sparse aperture masking doubled the number of companion candidates detected around transitional disks and examined how disk emission affects companion detections. Earlier studies had already pointed out that disk structures can mimic companion detections, but Matthew studied this effect systematically and derived diagnostics that can help to distinguish between disk structure and companion detections. He graduated from the University of Exeter in summer 2017.

Matthew then headed to Atlanta to join the Remote Sensing Group for Space Sciences of Georgia State University led by Professor Stuart Jefferies. Here he continued his interests in achieving diffraction limited imaging from ground-based optical telescopes. Matthew developed methods using wavefront sensor data to reconstruct images by accounting for turbulence at multiple levels in the atmosphere, and he showed how this approach can restore images over fields of view larger than a single isoplanatic patch.

His expertise in wave front sensor analysis then took him to the PSILab group led by Olivier Absil of the STAR Institute at University of Liège (October 2019). Matthew took up the challenging task of adapting a state-of-the-art wavefront sensing technique, referred to as PSI, to the context of the METIS instrument for the European Extremely Large Telescope. In particular, he found that PSI could be used to reduce the harmful effects of instrumental aberrations and water vapor turbulence on the performance of exoplanet imaging with METIS, which is a key step towards the first direct detection of Earth-like exoplanets in the mid-infrared. He was preparing a publication to summarize his ideas at the time of his death.

Matthew made friends wherever he travelled in his journey in astronomy. His quick wit, infectious smile, and gentle nature contributed to him being a much-loved member of his various research groups. He was a devoted fan of the Liverpool Football Club and passionate in his enthusiasm for all things related to football and rugby. Matthew

will be deeply missed by his family, friends, colleagues, and the students he inspired at Royal Holloway, University of Exeter, Georgia State University, and University of Liège. He will be remembered as a pioneer and explorer in the realm of imaging young planets.

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