

CURRICULUM VITAE ABREVIADO (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

Part A. PERSONAL INFORMATION

First name	Rainer		
Family name	Schoedel		
Gender (*)	Male	Birth date (dd/mm/yyyy)	08/10/1971
Social Security, Passport, ID number	X2222190E		
e-mail	rainer@iaa.es	https://ssg.iaa.csic.es/rainer-schoedel	
Open Researcher and Contributor ID (ORCID) (*)	0000-0001-5404-797X		

A.1. Current position

Position	Investigador Científico		
Initial date	16/02/2021		
Institution	Agencia Estatal Consejo Superior de Investigaciones Científicas		
Department/Center	Instituto de Astrofísica de Andalucía		
Country	Spain	Teleph. number	958 230 529
Keywords	Galactic centre, infrared astronomy, stellar populations, high angular resolution, massive black holes, galactic nuclei		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
2017-2021	Científico Titular/IAA-CSIC/Spain
2014-2017	Researcher (Excellence contract with ERC Cosolidator grant)/IAA-CSIC/Spain
2008-2014	Ramón y Cajal Fellow/IAA-CSIC/Spain
2004-2007	Postdoctoral Researcher/Universität zu Köln/Germany

A.3. Education

PhD	University/Country	Year
Natural Sciences	University of Munich/Germany	2004

Part B. CV SUMMARY (max. 5000 characters, including spaces)

My main research interests revolve around centre of our galaxy, such as the properties of the central massive black hole, Sagittarius A*, of the surrounding nuclear star cluster/nuclear stellar disc and interstellar medium, and the interactions between these components. On the technical side, I focus on high-angular resolution imaging techniques: Interferometry, adaptive optics (AO), speckle imaging, and sparse aperture masking, as well as the related image reconstruction and analysis techniques. I have profound expertise in precision astrometry and proper motion measurements. My observing proposals (as PI) have been awarded several 100h of time at the ESO VLT, among those a 160h ESO Large Programme of (195.B-0283).

I obtained my PhD degree with Dr. R. Genzel at the MPE/University of Munich in 2004. For my thesis I was awarded the Otto-Hahn medal by the Max-Planck-Society. I was awarded an



ERC Consolidator Grant in 2013 for my project GALACTICNUCLUES: “*The Fingerprint of a Galactic Nucleus: A Multi-Wavelength, High-Angular Resolution, Near Infrared Study of the Centre of the Milky Way*”.

My first significant contribution to Galactic centre research was the discovery of short-period orbits of stars around the Milky Way’s central black hole, Sagittarius A* (SgrA*). This finding allowed us to confirm the nature of this object and measure its mass and distance and was one of the pillars of the 2020 Nobel Prize for Physics (Genzel, Ghez). I continue to be involved in this work with Prof. Ghez’ group at UCLA. My further major contributions to the field are, among others: Precision measurements of the mass and distance of SgrA* as well as of GR effects in its vicinity, the discovery of near-infrared flares and of polarised light from SgrA*, the discovery of the stellar cusp around SgrA*, the determination of the dynamics, shape and mass of the Milky Way’s nuclear star cluster, the star formation histories of the nuclear stellar cluster and nuclear stellar disc, or the near-infrared extinction curve towards the centre of the Milky Way. With my ERC group we have carried out an unprecedented high-angular resolution multi-wavelength near-infrared study of our Milky Way’s nucleus. This GALACTICNUCLEUS survey supersedes other surveys of this region by a factor of >3 in angular resolution and is therefore the current benchmark survey of the Galactic centre, providing photometry that is several magnitudes deeper than data based on the next best survey. We are currently expanding our GALACTICNUCLEUS survey to the time domain (stellar variability and proper motions).

I maintain close collaborations around the world, in particular with the Galactic Center Group at UCLA, led by Prof. A. Ghez. I am a close external collaborator of this group and form part of their funding proposals (e.g. NSF, Keck foundation). I also collaborate closely with Shogo Nisihyama from Nagoya University, Japan, with Nadine Neumayer and F. Nogueras-Lara from MPIA (Germany), and Mathias Schultheis (Observatoire de la Côte d’Azur, France).

I have co-directed several master and PhD theses at the University of Cologne with Prof. A. Eckart. At the IAA-CSIC I have directed four PhD theses, with another two currently under way. The thesis by Joel Sánchez Bermúdez (2015) was awarded the prize for the best thesis in astronomy in Spain by the Sociedad Española de Astronomía. After obtaining an ESO fellowship, Joel is now assistant professor at UNAM, México. My PhD student Francisco Nogueras Lara is currently a Humboldt fellow at MPIA, Germany, and has just been awarded a fellowship at the ESO headquarters in Garching. I have supervised two postdocs at the IAA-CSIC (H. Dong 2014-2018 and B. Shahzamanian 2018-2022).

NASA/ADS lists to this date 164 refereed articles with me as the as first or co-author. My publications have accumulated a total of 10334 citations (normalized: 1346), an h-index of 50, an i10-index of 138, and an i100-index of 25. I have been an invited speaker at 25 international conferences.

I am a regular reviewer for A&A, ApJ, MNRAS and other journals. I have been a member of the ESO Observing Programme Committee (2012-2014) and the CAT of the Canary Islands telescopes (2010-2011, 2022-2024). I was a member of the Scientific Commission of the Spanish Astronomical Society in 2015-2019. I am the co-coordinator for thematic area 9 (*Understanding the basic components of the Universe, its structure and evolution*) of the Spanish Research Council’s (CSIC) White Book strategic initiative. At the IAA-CSIC I form part of the Executive and Scientific Committees of our Severo Ochoa Excellence programme (2018-2022, 2023-2026) and hold the responsibility as Training coordinator. I have been serving in the SOC of six international scientific meetings since 2012.



I have written eight outreach articles for German, Swiss, and Spanish journals and have imparted 24 public outreach talks since 2009.

Part C. RELEVANT MERITS

C.1. Publications

(selected from past 10 years; Acronyms: *A&A* – *Astronomy & Astrophysics*, *MNRAS* - *Monthly Notices of the Royal Astronomical Society*, *ApJ* – *The Astrophysical Journal*)

1. **R. Schödel**, F. Nogueras-Lara, M. Hosek et al. (2023): *The formation history of our Galaxy's nuclear stellar disc constrained from HST observations of the Quintuplet field*, **A&A**, 672, id.L8. – 1 citation
2. F. Nogueras-Lara, **R. Schödel**, N. Neumayer (2022): *Detection of an excess of young stars in the Galactic Centre Sagittarius B1 region*, **Nature Astronomy**, 6, 1178-1184. – 4 citation
3. A. Martínez-Arranz, **R. Schödel**, F. Nogueras-Lara, B. Shahzamanian (2022): *Distance to the Brick cloud using stellar kinematics*, **A&A**, 660, L3. – 2 citations
4. B. Shahzamanian, **R. Schödel**, F. Nogueras-Lara, A. Martínez-Arranz, M. C. Sormani, A. T. Gallego-Calvente, E. Gallego-Cano, A. Alburai (2022): *A proper motion catalogue for the Milky Way's nuclear stellar disc*, **A&A**, 662, id.A11. – 8 citations
5. **Book**: CSIC Scientific Challenges: Towards 2030. *Understanding the basic components of the universe, its structure & evolution*, Volume 9 of the collection "CSIC Scientific Challenges: Towards 2030", Coordination: María José Costa & **Rainer Schödel** (2021).
6. A. T. Gallego-Calvente, **R. Schödel**, A. Alberdi and 8 more (2021): *Radio observations of massive stars in the Galactic centre: the Arches cluster*, **A&A**, 647, id.A110. – 8 citations
7. **R. Schödel**, F. Nogueras-Lara, E. Gallego-Cano, B. Shahzamanian, A. T. Gallego-Calvente, A. Gardini (2020): *The Milky Way's nuclear star cluster: Old, metal-rich, and cuspy. Structure and star formation history from deep imaging*, **A&A**, 641, id.A102. – 43 citations
8. E. Gallego-Cano, **R. Schödel**, F. Nogueras-Lara, H. Dong, B. Shahzamanian, T. K. Fritz, A.T. Gallego-Calvente, N. Neumayer (2020): *New constraints on the structure of the nuclear stellar cluster of the Milky Way from star counts and MIR imaging*, **A&A**, Volume 634, id.A71. – 43 citations
9. F. Nogueras-Lara, **R. Schödel**, A. T. Gallego-Calvente and 10 co-authors (2020): *Early formation and recent starburst activity in the nuclear disk of the Milky Way*, **Nature Astronomy**, Volume 4, p. 377-381. – 74 citations
10. T. Do. A. Hees, A. Ghez, [...] **R. Schödel** (position 25)[...] and 25 co-authors (2019): *Relativistic redshift of the star S0-2 orbiting the Galactic Center supermassive black hole*, **Science**, 365, 664-668. – 260 citations
11. F. Nogueras-Lara, **R. Schödel**, A. T. Gallego-Calvente and 7 more (2019): *GALACTIC-NUCLEUS: A high-angular-resolution JHKs imaging survey of the Galactic centre. II. First data release of the catalogue and the most detailed CMDs of the GC*, **A&A**, Volume 631, id.A20.- 39 citations
12. F. Nogueras-Lara, **R. Schödel**, H. Dong and 10 more (2018): *The star formation history and metallicity in the galactic inner bulge revealed by the red giant branch bump*, **A&A**, 620, id.A83. – 32 citations
13. **R. Schödel**, E. Gallego-Cano, H. Dong, F. Nogueras-Lara, A.T. Gallego-Calvente, P. Amaro-Seoane, H. Baumgardt (2018): *The distribution of stars around the Milky Way's central black hole. II. Diffuse light from sub-giants and dwarfs*, **A&A**, 609, id.A27. – 107 citations



14. H. Dong, **R. Schödel**, B. F. Williams and 8 more (2017): *Near-infrared variability study of the central 2.3×2.3 arcmin² of the Galactic Centre - II. Identification of RR Lyrae stars in the Milky Way nuclear star cluster*, *MNRAS*, 471, 3617-3631. – 27 citations
15. K. Mužić, **R. Schödel**, A. Scholz, V. C. Geers, R. Jayawardhana, J. Ascenso, A. L. Cieza (2017): *The low-mass content of the massive young star cluster RCW 38*, *MNRAS*, 471, 3699-3712. – 35 citations
16. A. Boehle, A. M. Ghez, **R. Schödel** and 11 more (2016): *An Improved Distance and Mass Estimate for Sgr A* from a Multistar Orbit Analysis*, *ApJ*, 830, article id.1. – 291 citations
17. **R. Schödel**, A. Feldmeier, D. Kunneriath, S. Stolovy, N. Neumayer, P. Amaro-Seoane, S. Nishiyama (2014): *Surface brightness profile of the Milky Way's nuclear star cluster*, *A&A*, 566, id.A47. – 153 citations
18. **R. Schödel**, S. Yelda, A. Ghez, J. H. Girard, L. Labadie, R. Rebolo, A. Pérez-Garrido, M. R. Morris (2013): *Holographic imaging of crowded fields: high angular resolution imaging with excellent quality at very low cost*, *MNRAS*, 429, 1367-1375. – 41 citations

C.2. Congresses (invited talks, selected from past 10 years)

1. **Contributed talk:** What is the story of the Nuclear Star Cluster and of the Nuclear Stellar Disc? Puzzles of the Galactic Centre, Heidelberg, Germany, 6 Sept 2022.
1. **Invited talk:** *The Galactic Centre in the Thermal Infrared*. Ground-based thermal infrared astronomy - past, present and future. ESO Headquarters (Online), 16 Oct 2020.
2. **Invited talk:** *The nuclear stellar disc and cluster of the Milky Way*. Galactic Center Workshop 2019, Keio University, Yokohama, Japan, 24 Oct 2019.
3. **Invited talk:** *The stellar cusp at the Galactic Center and the missing giants problem*. The Exciting Lives of Galactic Nuclei, Ringberg Castle, Germany 27 Feb 2017.
4. **Invited talk:** *The stellar cusp around the Milky Way's central black hole*. 11th International LISA Symposium, Zürich, Switzerland, 7 Sep 2016.
5. **Invited talk:** Stellar Structure and Dynamics at the Galactic Center. Aspen Winter Conference, Aspen, USA, 7-12 Feb 2016.
6. **Invited talk:** The Milky Way's nuclear star cluster and massive black hole. IAU Symposium 312, Beijing, China, August 2014.
7. **Invited talk:** A specimen seen close up: the Milky Way's nuclear star cluster. The Unquiet Universe, Cefalù, Sicily, Italy, 6 Jun 2014.

C.3. Research projects (recent years)

1. PID2022-136640NB-C21 - Tracing the structure and evolution of the Milky Way through understanding the Galactic centre, star clusters, and massive stars, 01/01/2023-31/12/2025. 229.125€. Role: **PI**
2. EUR2022-134031 – Unpuzzling the Milky Way's Nucleus - Kinematics as Key to Structure, History, and Star Formation, 01/12/2022 - 30/11/2024. 89.646 €. Role: **PI**
3. P20_00753 – Descifrando la Vía Láctea: Minería de datos y herramientas numéricas para la explotación de grandes cartografiados galácticos, 05/10/2021 - 31/03/2023. 73.650 €. Role: **Col.**
4. PGC2018-095049-B-C21 – Los Galácticos de la Galaxia: Estrellas masivas, cúmulos estelares y el centro Galáctico, 01/01/2019 - 31/12/2022. 159.300 €. Role: **PI and coordinator.**
5. Consolidator Grant 2013 - No. 614922 European Research Council: *The Fingerprint of a Galactic Nucleus: A Multi-Wavelength, High-Angular Resolution, Near Infrared Study of the Centre of the Milky Way*, PI: Rainer Schödel. 01/02/2014 - 31/01/2019. 1.547.657 €. Role: **PI.**