Dr Aaron Timothy Hess
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Appointments

Senior MRI Physicist - OCMR	Oxford, UK Dec 2019 – Present
Acting Associate Director of Oxford-Nottingham Biomedical Imaging Centre for Doctoral Training, MPLS, Oxford (0.5 FTE)	Oxford, UK Jul 2016 – Jul 2017
BHF transitional intermediate fellow, BHF Centre of research excellence, Oxford	Oxford, UK Jul 2016 – Dec 2019
Postdoctoral research fellow, cardiac 7T, University of Oxford Centre for Clinical Magnetic Resonance Research	Oxford, UK Mar 2011 – July 2016
Visiting scientist Harvard/MIT/MGH Athinoula Martinos Center for Biomedical Imaging	Boston, USA May 2009 – Aug 2009 May 2010 – Aug 2010
Research and development engineer N-Tyre solutions	Johannesburg, South Africa Jan 2006 – Jan 2008

Education

Ph.D. “Motion corrected MRI and MRS for paediatric imaging” University of Cape Town	Cape Town, South Africa Feb 2008 - Mar 2011
M.Sc. in Biomedical Engineering – “3D cardiac strain with MRI” With distinction University of Cape Town	Cape Town, South Africa Feb 2004 - Mar 2006
B.Sc. in Electrical and Computer Engineering With first class honours University of Cape Town	Cape Town, South Africa Feb 2000 - Dec 2003
A ‘levels – Math’s, Physics, Art Gateway High School	Harare, Zimbabwe Jan 1998 – Dec 1999

Research outputs

3 patents, 40 publications, 17 first or senior author papers, h-index of 17 / i10 of 25 and 159 citations

Awards

Most downloaded paper – Magnetic Resonance in Medicine – 2018-2019	2020
Best work on “Clinical Translation of 7T” from Ultrahigh field Magnetic Resonance meeting, Berlin, Germany.	2019
Best postdoctoral poster at Oxford BHF CRE annual symposium	2019
BHF transitional intermediate fellowship – BHF CRE Oxford	2016
ISMRM summa cum laude (to 3% of abstracts)	2016
Rewards and Recognition – Radcliffe Department of Medicine	2014

Doctoral research scholarship, Harry Crossley, Marcus Rubin,	2008-2010
University of Cape Town international travel award (J.W de Jager)	2006 & 2008
University of Cape Town Research Associate	2005
Engineering deans merit list (to 10% of all engineering students)	2000-2002

Supervision

DPhil, James Kent "Ultrahigh field cardiac imaging"	2020-Present
DPhil, M.H.S de Buck, "Compressed sensing angiography"	2019-present
DPhil, Charlie Millard, Siemens iCASE - underway on new compressed sensing algorithms	2018-present
DPhil, Sven Jaeschke, "Motion Estimation Using the RF-Scattering of a Parallel Transmit Coil for ECG-free, Free Breathing Cardiac Magnetic Resonance Imaging at 7T"	2016-2019
DPhil, Hongbae Jeong, "Radiofrequency safety modelling of parallel transmit magnetic resonance imaging"	2015 - 2018
Postdoc – Sofia Dimoudi – Normalized iterative hard thresh holding compressed sensing algorithm	Nov 2016 – Mar 2018

Teaching

Introduction to medical imaging for DPhil students, module leader	2015 - 2019
Advanced medical imaging for DPhil students	2015-2019
Imaging biomarkers and their design, module leader	2016-2017
Siemens pulse sequence programing	2012-2015

Invited talks (selected)

Berlin Ultrahigh field meeting	2019
Leeds university	2018
ISMRM motion correction workshop	2017
European society for cardiology congress	2017
UK 7T network: RF Safety at 7T	2017
University of Cape Town and Grooteschur hospital	2015
Siemens Euro IDEA users meeting	2014
Oxford international 4D flow workshop	2014

Journals/Grant Bodies reviewed for

[1] Magnetic Resonance in Medicine (MRM), [2] IEEE Transactions on medical imaging, [3]Journal of Cardiac Magnetic Resonance (JCMR), [4]Journal of Magnetic Resonance Imaging (JMRI), [5]Medical Engineering & Physics, [6]Magnetic Resonance Materials in Physics, [7]Biology and Medicine (MAGMA) [8] Heart Research UK, [9] Netherlands Organisation for Scientific Research

Meetings organized

Co-chair of the ISMRM 2020 motion correction workshop in Oxford
Organisation of 2014 international workshop on 4D flow in Oxford

Committee membership

[1] International society of Magnetic Resonance in Medicine (ISMRM) - safety committee – committee overseeing the international society's stance on safety including 7T.
[2] International society of Magnetic Resonance in Medicine (ISMRM)study group for detection and correction of motion – secretary 2020/2021
[3]WIN MRI RF coil safety committee; [4]WIN safety committee: Overseeing standard operating procedures, approval of MR equipment, and review of admissibility of subjects to the MR.

Grant funding

Description	Roll	Value	Year
Siemens and EPSRC industrial CASE studentship (James Kent)	Co-supervisor	£30 000 + £91 800	2020-2024
Siemens and EPSRC industrial CASE studentship (Charlie Millard)	Co-supervisor	£58 000 + £91 800	2018-2022
Oxford British Heart Foundation Centre of research excellence: Infrastructure, for 7T RF-coil	Principal Investigator	£35 000	2017
Oxford British Heart Foundation Centre of research excellence: – 3 year Transitional intermediate fellowship – "Ultra-high resolution imaging with 7T MRI: atrial structure and function". Funded me for the duration and a postdoc for one year.	Principal Investigator	£249 000	2016-2019
Siemens healthcare part-funded an ONBI EPSRC funded doctoral student (Sven Jaeschke)	Principal supervisor	£30 000 + £91 880	2016-2019
EPSRC Institutional Sponsorship block grant: Funded 3 months postdoc salary and new computer	Co-investigator	£36 000	2016-2017

Patents

1. (Inventor) Patent 1818147.9 Enhanced BOLD imaging as a diagnostic, 2019
2. (Inventor) Patent US62/476250 "Extracting patient motion from multi-channel electrical coupling for MRI", 2017
3. (Inventor) Patent US62/676,651 "Methods for monitoring motion using multi-transmit electrical coupling in imaging of the subject", 2018

Conference: Selected recent peer reviewed abstracts

C1. S.H.F Jaeschke, **A.T. Hess**. "Cartesian prospective, duel-gated, cardio-respiratory encoding for 3D cardiac CINE compared to spiral profile retrospective encoding". ISMRM 2020

C2. C Millard, **AT Hess**, B Mailhé, J Tanner. "Versatile Parameter-Free Compressed Sensing MRI with Approximate Message Passing". ISMRM 2020

C3. B Raman, K Chan, R Ariga, M Mahmod, M Hundertmark, S Sivalokanathan, T D Karamitsos, J Selvanayagam, **A.T Hess**, E Tunnicliffe, H Watkins, S Neubauer. "Impaired Stress Myocardial Oxygenation and Not Perfusion Reserve is Associated With Arrhythmic Risk in Hypertrophic Cardiomyopathy: Insights From a Novel Oxygen Sensitive Betty BOLD". *American Heart Association 2019*

C4. S Dimoudi, MD Robson, J Tanner, **A.T Hess**. "Evaluating the Normalised Iterative Hard Thresholding Algorithm for Compressed Sensing Reconstruction on 7T Cardiac cine MRI". ISMRM 2018 p3540

C5. Hess AT, Jaeschke S, Chiew M. "Click and run respiratory resolved, ECG and navigator free cardiac B0 and relative B1 calibration at 7T", 2019 ISMRM Workshop on Ultrahigh Field Magnetic Resonance, Dubrovnik, Croatia

C6. Hess AT, Tanner J, Dragonu I, Chiew M. "Accelerated 3D relative transmit mapping using structured low-rank matrix completion – evaluated in the body and brain". 2019 ISMRM Workshop on Ultrahigh Field Magnetic Resonance, Dubrovnik, Croatia

C7. H Jeong, M Restivo, P Jezzard, **A.T. Hess**. "Platform for Validating pTx RF Coil Simulations Using Proton Resonance Frequency Shift MR Thermometry". ISMRM 2018 p4394

C8. H Jeong, J Andersson, **A.T. Hess**, P Jezzard. "Feasibility of personalized RF safety monitoring in pTx MRI using linear registration versus non-linear registration". ISMRM 2018 P4152

C9. E Tunnicliffe, J Andersson, A.T Hess, M.D Robson. "Feasibility of EPI for cardiac diffusion at 7T" - ISMRM (2018) p4767

Publications - Preprints and in preparation

1. H Jeong, P Jezzard, **A.T Hess**. Validation of a phantom and multi-echo proton resonance frequency shift thermometry sequence for assessment of radio-frequency heating in a parallel transmit coil. In preparation.
2. M Spartera, G Pessao-Amorim, A. Stracquadanio, A Von Ende, A Fletcher, P Manley, V.M. Ferreira, S Neubauer, B Casadei, R.S. Wijesurendra , **A.T Hess**. "Left atrial 4d flow mri: reproducibility, temporal variability, and sample size calculations for clinical studies of embolic stroke risk" – in preparation
3. **A. T Hess**, I Dragonu, M Chiew. Accelerated calibrationless parallel transmit mapping using joint transmit and receive low-rank tensor completion. arXiv preprint arXiv:2011.06471

Publications – First or senior author

4. M.H.S de Buck, P Jezzard, H Jeong, **A.T Hess**. An investigation into the minimum number of tissue groups required for 7T in-silico parallel transmit electromagnetic safety simulations in the human head. *Magn Reson Med* 2020 DOI: 10.1002/mrm.28467
5. S.H.F Jaeschke, M.D Robson, **A.T Hess**. Scattering Matrix Imaging Pulse Design for Real-time Respiration and Cardiac Motion Monitoring. *Magn Reson Med* 2019*.* doi.org/ 10.1002/mrm.27884
6. V.M Stoll, M Loudon, J Eriksson, M.M Bissell, P Dyverfeldt, T Ebbers, S.G Myerson, S Neubauer, C Carlhäll, **A.T. Hess**. Test-retest variability of left ventricular 4D flow cardiovascular magnetic resonance measurements in healthy subjects. Journal of Cardiovascular Magnetic Resonance 2018. doi.org/10.1186/s12968-018-0432-4
7. S.H.F Jaeschke, M.D Robson, **A.T Hess**. Cardiac gating using scattering of an 8-channel parallel transmit coil at 7T. *Magn Reson Med* 2018 pp 633-640*.* doi.org/10.1002/mrm.27038
8. **A.T. Hess**, E.M. Tunnicliffe, C.T. Rodgers, M.D. Robson. Diaphragm position can be accurately estimated from the scattering of a parallel transmit RF coil at 7 T. Magn Reson Med. 2016 doi: 10.1002/mrm. 26866
9. **A.T. Hess,** M.D. Robson. Hexagonal gradient scheme with RF spoiling improves spoiling performance for high-flip-angle fast gradient echo imaging. *Magn Reson Med*. 2016 doi: 10.1002/mrm.26213
10. **A.T. Hess**, M.M. Bissell, N.A. Ntusi, A.J. Lewis, E.M. Tunnicliffe, A. Greiser, A.F. Stalder, J.M. Francis, S.G. Myerson, S. Neubauer, M.D. Robson. Aortic 4D flow: Quantification of signal-to-noise ratio as a function of field strength and contrast enhancement for 1.5T, 3T, and 7T. Magn Reson Med. 2014 doi: 10.1002/mrm.25317.
11. **A.T. Hess**, S.W. Jacobson, J.L. Jacobson, C.D. Molteno, A.J.W. van der Kouwe, E.M. Meintjes. A comparison of spectral quality in magnetic resonance spectroscopy data acquired with and without a novel EPI-navigated PRESS sequence in school-aged children with fetal alcohol spectrum disorders. Metabolic Brain Disease, 2014 29(2):323-32.
12. **A. T. Hess**, B. Laughton, K. Mbugua, A. J.W. van der Kouwe, E. M. Meintjes. "Quality of 186 child brain spectra using motion and B0 shim navigated single voxel spectroscopy". *Journal of magnetic resonance imaging.* 2014 40(4):958-65. DOI: 10.1002/jmri.24436
13. **A. T. Hess**, O. C. Andronesi, M. D.Tisdall, A. G. Sorensen, A. J. W. van der Kouwe, E. M. Meintjes. "Real-time motion and B0 correction for localized adiabatic selective refocusing (LASER) MRSI using echo planar imaging volumetric navigators". *NMR Biomed*. 2012, 25(2), 347-58.

14. **A. T. Hess**, M. D. Tisdall, O. C. Andronesi, E. M. Meintjes, A. J. W. van der Kouwe. “Real-time motion and B0 corrected single voxel spectroscopy using volumetric navigators”. *Magnetic Resonance in Medicine.* 2011, 66 (2), 314-323
15. **A. T. Hess**, X. Zhong, B. S. Spottiswoode, F. H. Epstein, E. M. Meintjes. “Myocardial 3D Strain Calculation by Combining Cine Displacement Encoding with Stimulated Echoes (DENSE) and Cine Strain Encoding (SENC) Imaging “. *Magnetic Resonance in Medicine*. 2009, Vol 62:1, pp 77 – 84.

Publications (co-author)

16. C. Millard, **A. T. Hess**, B. Mailhé and J. Tanner, "Approximate Message Passing With a Colored Aliasing Model for Variable Density Fourier Sampled Images," in IEEE Open Journal of Signal Processing, vol. 1, pp. 146-158, 2020, doi: 10.1109/OJSP.2020.3025228.
17. O. Andronesi, W Bogner, M.D Tisdall, **A.T Hess**, P Bhattacharyya, E Meintjes, P Lee, M Zaitzev, A van der Kouwe. “Motion Correction Methods for Magnetic Resonance Spectroscopy: Experts' Consensus Recommendations”. *NMR in biomedicine* 2020. DOI: 10.1002/nbm.4364
18. R Frost, L Biasiolli, L Li, K Hurst, M Alkhalil, R P Choudhury, M D Robson, **A. T Hess,** P Jezzard. “Navigator-based reacquisition and estimation of motion-corrupted data: application to multi-echo spin echo for carotid wall MRI”. *Magnetic Resonance in Medicine*. 2019, DOI: 10.1002/mrm.28063
19. V Stoll, **A.T Hess**, C Rodgers, M Bissell, P Dyverfeldt, T Ebbers, S Myerson, C Carlhall, S Neubauer. Left Ventricular Flow Analysis: Novel Imaging Biomarkers and Predictors of Exercise Capacity in Heart Failure. *Circulation. Cardiovascular imaging.* 2019, doi.org/10.17863/CAM.38573
20. M.M Bissell, M Loudon, **A.T Hess**, V Stoll, E Orchard, S Neubauer, S.G Myerson. Differential flow improvements after valve replacements in bicuspid aortic valve disease: a cardiovascular magnetic resonance assessment. *Journal of Cardiovascular Magnetic Resonance* 2018. doi.org/10.1186/s12968-018-0431-5
21. Malenka M Bissell, Luca Biasiolli, Abhishek Oswal, Margaret Loudon, **A. T. Hess**, Hugh Watkins, Stefan Neubauer, Saul G Myerson. “Inherited Aortopathy Assessment in Relatives of Patients With a Bicuspid Aortic Valve”. *Journal of the American College of Cardiology*. 2017 69:7, pp 904-906
22. K.K Mbugua, M.J Holmes, M.F Cotton, E.M Ratai, F. Little, **A.T. Hess**, E. Dobbels, A.J.W. Van der Kouwe, B Laughton, E.M. Meintjes. “HIV-associated CD4/8 depletion in infancy is associated with neurometabolic reductions in the basal ganglia at age 5 years despite early antiretroviral therapy”. AIDS 2016
23. R. Frost, **A.T. Hess**, T.W. Okell, M.A Chappell, M.D. Tisdall, A.J.W. van der Kouwe, P. Jezzard. “Prospective motion correction and selective reacquisition using volumetric navigators for vessel-encoded arterial spin labeling dynamic angiography.” Magn Reson Med 2015, doi: 10.1002/mrm.26040
24. F. Padormo, **A.T. Hess**, P. Aljabar, S.J. Malik, P. Jezzard, M.D. Robson, J.V. Hajnal, P. J. Koopmans. Large Dynamic Range Relative B1+ Mapping. MRM 2015, 10.1002/mrm.25884
25. C. Lemke, **A. Hess**, S. Clare, V Bachtiar, C. Stagg, P. Jezzard, U. Emir. Two-voxel spectroscopy with dynamic B0 shimming and flip angle adjustment at 7 T in the human motor cortex. NMR in Biomedicine. 2015 28(7), pp652-60
26. D Rosenstein, **A. T Hess**, J Zwart, F Ahmed-Leitao, E Meintjies, S Seedat. “Single voxel proton magnetic resonance spectroscopy (H-1-MRS) and volumetry of the amygdala in social anxiety disorder in the context of early developmental trauma”. *South African Journal of Psychiatry* 2015 21:3 pp. 115-116
27. D Rosenstein, **AT Hess**, F Ahmed-Leitao, J Zwart, E Meintjies, S Seedat “Social anxiety disorder in the context of early developmental trauma: Structural magnetic resonance imaging (sMRI) and proton magnetic resonance imaging findings (1H-MRS)”. *South African Journal of Psychiatry* 2014 20(3) pp 124

28. Malenka M Bissell, **A. T Hess**, Luca Biasiolli, Steffan J Glaze, Margaret Loudon, Alex Pitcher, Anne Davis, Bernard Prendergast, Michael Markl, Alex J Barker, Stefan Neubauer, Saul G Myerson Response to letter regarding article,"Aortic dilation in bicuspid aortic valve disease: flow pattern is a major contributor and differs with valve fusion type". Circulation: Cardiovascular Imaging 7(1) pp 214
29. Y. Tao, **A.T. Hess**, G.A. Keith, C.T. Rodgers, A. Liu, J.M. Francis, S. Neubauer, M.D. Robson. Optimized saturation pulse train for human first-pass myocardial perfusion imaging at 7T. Magn Reson Med. 2014 doi: 10.1002/mrm.25262.
30. O. Hinds, P Wighton, M.D. Tisdall, **A. Hess**, H Breiter, A. van der Kouwe. Neurofeedback using functional spectroscopy. Int J Imaging Syst Technol. 2014 24(2) p 138-148
31. N. Filippini, E. Zsoldos, R. Haapakoski, C.E. Sexton, A. Mahmood, C.L. Allan, A. Topiwala, V. Valkanova, E.J. Brunner, M.J. Shipley, E. Auerbach, S. Moeller, K. Uğurbil, J. XuJ, E. Yacoub, J. Andersson, J. Bijsterbosch, S. Clare, L. Griffanti, **A.T. Hess**, M. Jenkinson, K.L. Miller, G. Salimi-Khorshidi, S.N. Sotiropoulos, N.L. Voets, S.M. Smith SM, J.R. Geddes, A. Singh-Manoux, C.E. Mackay, M. Kivimäki, K.P. Ebmeier KP. Study protocol: The Whitehall II imaging sub-study. BMC Psychiatry. 2014 May 30;14:159
32. G.A. Keith, C.T. Rodgers, **A.T. Hess**, C.J. Snyder, J.T. Vaughan, M.D. Robson. Automated tuning of an eight-channel cardiac transceive array at 7 Tesla using piezoelectric actuators. Magn Reson Med. 2014 doi: 10.1002/mrm.25356
33. L. Du Plessis, J. Jacobson, S. Jacobson, **A.T. Hess**, A.J.W. Van der Kouwe, M. Avison, C. Molteno, M. Stanton, J. Stanley, B. Peterson, E.M. Meintjes. An in vivo 1H Magnetic Resonance Spectroscopy Study of the Deep Cerebellar Nuclei in Children with Fetal Alcohol Spectrum Disorders. Alcoholism: Clinical and Experimental Research. 2014 38(5):1330-8
34. W. Bogner, B. Gagoski , **A.T. Hess**, Bhat H, M.D. Tisdall, A.J.W. van der Kouwe, B Strasser, M Marjańska, S. Trattnig, E Grant, B. Rosen, O.C Andronesi. 3D GABA imaging with real-time motion correction, shim update and reacquisition of adiabatic spiral MRSI. *Neuroimage*. 2014 doi: 10.1016/j.neuroimage.2014.09.032
35. W. Bogner, **A.T. Hess**, B. Gagoski, M.D. Tisdall, A.J.W. van der Kouwe, S. Trattnig, B. Rosen, O.C Andronesi. Real-time motion- and B0-correction for LASER-localized spiral-accelerated 3D-MRIS of the brain at 3 T. NeuroImage. 2014: 88 22-31. DOI: 10.1016/j.neuroimage.2013.09.034.
36. M.M. Bissell, **A.T. Hess**, L. Biasiolli, S.J. Glaze, M. Loudon, A. Pitcher, A. Davis, B. Prendergast, M. Markl, A.J. Barker, S. Neubauer, S.G. Myerson. Response to letter regarding article, "Aortic dilation in bicuspid aortic valve disease: flow pattern is a major contributor and differs with valve fusion type". *Circulation. Cardiovascular Imaging.* 2014, Jan;7(1):214. doi: 10.1161/CIRCIMAGING.113.001497.
37. M.M. Bissell, **A.T. Hess**, L. Biasiolli, S.J. Glaze, M. Loudon, A. Pitcher, A. Davis, B. Prendergast, M. Markl, A.J. Barker, S. Neubauer, S.G. Myerson. Aortic dilation in bicuspid aortic valve disease: flow pattern is a major contributor and differs with valve fusion type. *Circulation. Cardiovascular Imaging.* 2013, 6(4), 499-507.
38. Alhamud A, M. D. Tisdall, **A. T. Hess**, K. M. Hasan, E. M. Meintjes, A. J. W. van der Kouwe." Volumetric navigators for real-time motion correction in diffusion tensor imaging. *Magnetic Resonance in Medicine* . 2012, 68(4), 1097-108
39. M. D. Tisdall**, A. T. Hess**, M. Reuter, E. M. Meintjes, B. Fischl, A. J. van der Kouwe. "Volumetric navigators for prospective motion correction and selective reacquisition in neuroanatomical MRI". *Magnetic Resonance in Medicine* . 2012, 68(2),389-99
40. B. S. Spottiswoode, X Zhong, **A. T. Hess**, C. M. Kramer, E. M. Meintjes, B. M. Mayosi, F. H. Epstein. "Tracking Myocardial Motion From Cine DENSE Images Using Spatiotemporal Phase Unwrapping and Temporal Fitting". *IEEE Transactions on Medical Imaging*. 2007, V26 pp 15 – 30.