CV - Zoltán Haiman

Personal Born May 8, 1971, Budapest, Hungary

Present Positions Full Professor, *Department of Astronomy, Columbia University*
Full Professor, *Department of Physics, Columbia University*

Education
1998 Ph.D., Astronomy, Harvard University
1995 Postgraduate Certificate, Physics & Chemistry, Cambridge University
1994 M.A., Astronomy, Harvard University
1993 B.S., Physics and B.S., Electrical Engineering, both at MIT

Previous Positions

2008 – 2013	Associate Professor, *Department of Astronomy, Columbia University*
2003 – 2007	Assistant Professor, *Department of Astronomy, Columbia University*
1999 – 2002	Hubble Fellow, *Astrophysics Department, Princeton University*
1998 – 1999	Research Associate, *Fermi National Accelerator Laboratory*

Awards and Honors

2016	Simons Fellowship in Theoretical Physics (Simons Foundation)
2010	Blavatnik Award for Young Scientists (New York Academy of Sciences)
2004	New York City Mayor's Award for Excellence in Science and Technology (finalist)
2002	Brilliant 10, Popular Science Magazine (top 10 young US scientists)
1997 – 1998	Merit Fellowship, Harvard University
1994 – 1995	Isaac Newton Studentship, Cambridge University
1994 – 1995	Cambridge European Trust Overseas Research Scholarship
1993	Sigma Pi Sigma, Phi Beta Kappa, and Eta Kappa Nu Honor Societies, MIT

PhD Students *I supervised 10 Astronomy and 6 Physics PhDs completed over the past 16 years:*

2020	José Manuel Zorrilla Matilla (physics teacher, Phillips Exeter Academy)
	Andrea Derdzinski (postdoc, ETH, Zurich, Switzerland)
2019	Jemma Wolcott-Green (NSF Fellow at University of California, Santa Barbara)
2017	Maria Charisi (postdoc, Vanderbilt University)
	Andrea Petri (in finance)
2016	Jia Liu (junior faculty, IPMU, University of Tokyo, Japan)
	Daniel D'Orazio (junior faculty, NBI, University of Copenhagen, Denmark)
2013	Xiuyuan Yang (in finance)
2011	Taka Tanaka (in data science)
2010	Cien Shang (computational physicist, St. Jude Children's Hospital, Memphis, TN)
	Wenjuan Fang (faculty at University of Science and Technology of China, Hefei)
2009	Roban Kramer (in high-tech industry)
	Bence Kocsis (faculty at University of Oxford, UK)
2007	Sheng Wiley Wang (in finance)
2006	Andrei Mesinger (faculty at University of Pisa, Italy)
2005	Mark Dijkstra (in data science)

Postdocs *I have mentored or co-mentored 8 postdocs over the past 16 years:*

2021 –	Hiromichi Tagawa (JSPS Fellow at Columbia)
2020 –	Jordy Davelaar (joint CCA - THEA Fellow
2020 –	Kung-Yi Su (now postdoc at ITC, Harvard University)
2020 –	Ryan Westermacher-Schneider (now postdoc at Leiden University, The Netherlands)
2018 – 2020	Jonathan Zrake (now faculty at Clemson University, South Carolina)
2014 – 2018	Kohei Inayoshi (JSPS and Simons Fellow; now faculty at Peking University, China)
2013 – 2016	James Colin Hill (Simons Fellow 2014-2017; now faculty at Columbia University)
2013 – 2016	Eli Visbal (Columbia Prize Fellow; now faculty at University of Toledo, Ohio)
2011 – 2015	Brian Farris (joint NYU/Columbia postdoc; now in high-tech industry)
2006 – 2009	Jan Kratochvil (ISCAP postdoc; left the field)
2003 – 2005	Justin Khoury (ISCAP postdoc; now faculty at University of Pennsylvania)

Federal Research Support as Principal Investigator ($6M total as Columbia faculty)

2022 – 2025 (NASA)	Orbital Evolution and Multi-Messenger Signatures of Binary Black Holes with Circumbinary Disks [$448k]
2020 – 2023 (NSF)	Forming the First Massive Black Holes [$776k]
2018 – 2021 (NASA)	Realizing the Full Potential of Weak Lensing Cosmology [$615k]
2017 – 2020 (NSF)	The Long-Term Evolution of Binary Black Holes with Circumbinary Disks [$436k]
2017 – 2020 (NASA)	Uncovering the Population of Compact Supermassive Black Hole Binaries [$502k]
2018 – 2019 (NASA)	Testing the Origin of Periodic Variability for the Binary Candidate Quasar PG1302-102, Swift Cycle 14 [$33k]
2017 – 2018 (NASA)	Testing the Origin of Periodic Variability for the Binary Candidate Quasar PG1302-102, Swift Cycle 13 [$42k]
2015 – 2018 (NASA)	Self-Consistent Models for Primordial Star-Formation and Reionization [$412k]
2012 – 2015 (NSF)	Cosmology from Non-Linear Weak Lensing [$411k]
2011 – 2014 (NASA)	The Response of a Circumbinary Disk to a Black Hole Merger [$581k]
2005 – 2010 (NSF)	A Multi-Wavelength Calibration of Galaxy Clusters as Cosmological Probes [$960k]
2005 – 2006 (NASA)	Gamma Ray Bursts as Probes of Early Structure Formation [$60k]
2004 – 2008 (NASA)	The Earliest Astrophysical Structures and the History of Reionization [$258k]
2003 – 2006 (NSF)	Fireworks at the Ballet: Globular Cluster Formation, Bulge Dynamics and the Role of Central Black Holes in Galaxy Mergers [$48k]
2003 – 2006 (NSF)	Multiwavelength Signatures of the First Stars and Quasar Black Holes [$263k]

Service and Other Activities

2019 –	NASA LISA Study Team (NLST), NASA-appointed member
2018 –	LISA Science Group (LSG), ESA board-appointed member
2017 –	Science and Technology Definition Team (STDT) for Lynx, NASA-appointed member
2009 –	Co-director, Institute for Strings, Cosmology, and Particle Physics (ISCAP, Columbia)
2003	Co-Investigator for DECS: a JDEM proposal for a new X–ray satellite
2003 – ongoing	I have served on most major review panels in the field, including NASA, NSF, and DOE physics and astronomy proposal panels, the NSF CAREER program; NASA, NSF, and Hubble postdoctoral fellowship programs, and many international proposal selection panels, including the European Research Council and the major national science funding agencies in Austria, Chile, the Czech Republic, Germany, Hungary, India, Israel, the Netherlands, Qatar, Russia, Serbia, South Africa, Switzerland, and the UAE.

Publications 270 peer-reviewed publications with 20,000+ total NASA ADS citations (*h-index=80*)
This excludes large collaboration papers with minor contributions & long author lists
210+ invited talks, including conferences, colloquia, and seminars in last 20 years

Note – I list below, in reverse-chronological order, my peer-reviewed research papers (I), invited review papers (II), conference papers (III) and other published work, such as white papers (IV). Please note that the vast majority of my publications are few-author papers with my research group. These research papers (i.e. excluding papers with large collaborations) have a total of 20,000+ citations, and an *h-index=80* (source: NASA ADS, Oct. 2022).

I. Peer–Reviewed Journal Publications [published, in press, or submitted]

269. K.-Y. Su, G. L. Bryan, **Z. Haiman**, R. S. Somerville, C. C. Hayward & C.-A. Faucher-Giguère, "Self-regulation of black hole accretion via jets in early protogalaxies", *Monthly Notices of the Royal Astronomical Society*, submitted June 2022; e-print arXiv:2206.14459 (2022).

268. D. Toyouchi, K. Inayoshi, W. Li, **Z. Haiman** & R. Kuiper, "Radiative feedback on supermassive star formation: the massive end of the Population III initial mass function", *Monthly Notices of the Royal Astronomical Society*, in press; e-print arXiv:2206.14459 (2022).

267. M. E. Lee, T. Lu, **Z. Haiman**, J. Liu & K Osato, "Comparing weak lensing peak counts in baryonic correction models to hydrodynamical simulations", *Monthly Notices of the Royal Astronomical Society*, submitted January 2022; e-print arXiv:2201.08320 (2022).

266. J. R. Westernacher-Schneider, J. Zrake, A. MacFadyen & **Z. Haiman**, "Multi-band light curves from eccentric accreting supermassive black hole binaries", *Physical Review D*, **106**, Issue 10, article id.103010 (2022).

265. H. Hu, K. Inayoshi, **Z. Haiman**, W. Li, E. Quataert & Rolf Kuiper, "Supercritical growth pathway to overmassive black holes at cosmic dawn: coevolution with massive quasar hosts", *The Astrophysical Journal*, **935**, Issue 2, id. 140, 6 pp. (2022).

264. H. Hu, K. Inayoshi, **Z. Haiman**, E. Quataert & Rolf Kuiper. "Long-term evolution of supercritical black hole accretion with outflows: a subgrid feedback model for cosmological simulations". *The Astrophysical Journal*, **934**, Issue 2, id. 132, 13pp. (2022).

263. J. Davelaar & **Z. Haiman**, "Self-lensing flares from black hole binaries: observing black hole shadows via light-curve tomography". *Physical Review Letters*, **128**, 191101 (2022); selected as a "Featured in Physics" focus article.

262. J. Davelaar & **Z. Haiman**, "Self-lensing flares from black hole binaries: general-relativistic ray tracing of black hole binaries" *Physical Review D*, **105**, Issue 10, article id. 103010 (2022).

261. D. J. D'Orazio, **Z. Haiman**, J. Levin, J. Samsing & A. Vigna-Gomez, "Multi-Messenger Constraints on Magnetic Fields in Merging Black Hole-Neutron Star Binaries", *The Astrophysical Journal*, **927**, Issue 1, Article id. 56 (2022).

260. C. Tiede, J. Zrake, A. MacFadyen & **Z. Haiman**, "How binaries accrete: hydrodynamics simulations with passive tracer particles", *The Astrophysical Journal*, **932**, Issue 1, id. 24, 14 pp. (2022).

259. H. Tagawa, S. S. Kimura, **Z. Haiman**, R. Perna, H. Tanaka & I. Bartos, "Can stellar-mass black hole growth disrupt disks of active galactic nuclei? The role of mechanical feedback", *The Astrophysical Journal*, **927**, Issue 1, id. 41, 16 pp. (2022).

258. T. Lu, **Z. Haiman** & J. M. Zorrilla, "Simultaneously constraining cosmology and baryonic physics via deep learning from weak lensing", *Monthly Notices of the Royal Astronomical Society*, **511**, Issue 1, pp. 1518-1528 (2022).

257. P. Upton Sanderbeck, S. Bird & **Z. Haiman**, "Nucleosynthetic signatures of primordial origin around supermassive black holes", *Physical Review D*, **104**, Issue 10, article id. 103022 (2021).

256. A. Sabyr, **Z. Haiman**, J. M. Zorrilla & T. Lu, "Cosmological Constraints from Weak Lensing Peaks: Can Halo Models Accurately Predict Peak Counts?", *Physical Review D*, **105**, Issue 2, article id. 023505 (2022).

255. Y. Yang, I. Bartos, G. Fragione, **Z. Haiman**, M. Kowalski, S. Marka, R. Perna & H. Tagawa, "Micro Tidal Disruption Events in Active Galactic Nuclei", *The Astrophysical Journal (Letters)*, **933**, Issue 2, id. L28, 6 pp. (2021).

254. C. Xin & **Z. Haiman**, "Ultra-short-period massive black hole binary candidates in LSST as LISA "verification binaries", *Monthly Notices of the Royal Astronomical Society*, **506**, Issue 2, pp. 2408-2417 (2021).

253. V. Gayathri, Y. Yang, H. Tagawa, **Z. Haiman** & I. Bartos, "Black hole mergers of AGN origin in LIGO/Virgo's O1-O3a observing periods", *The Astrophysical Journal (Letters)*, **920**, Issue 2, id. L42, 7 pp. (2021).

252. H. Tagawa, **Z. Haiman**, I. Bartos, B. Kocsis & K. Omukai, "Signatures of hierarchical mergers in black hole spin and mass distribution", *Monthly Notices of the Royal Astronomical Society*, **507**, Issue 3, pp. 3362-3380 (2021).

251. T. Lu & **Z. Haiman**,, "The impact of baryons on cosmological inference from weak lensing statistics", *Monthly Notices of the Royal Astronomical Society*, **506**, Issue 3, pp. 3406-3417 (2021).

250. M. Dotti, M. Bonetti, D. J. D'Orazio, **Z. Haiman** & L. C. Ho, "Binary black hole signatures in polarized light curves", *Monthly Notices of the Royal Astronomical Society*, **509**, Issue 1, pp. 212-223 (2022).

249. K. Inayoshi, K. Kashiyama, E. Visbal & **Z. Haiman**, "Gravitational wave backgrounds from coalescing black hole binaries at cosmic dawn: an upper bound", *The Astrophysical Journal*, **919**, Issue 1, id. 41 (2021).

248. R. Perna, H. Tagawa, **Z. Haiman** & I. Bartos, "Accretion-Induced Collapse of Neutron Stars in the Disks of Active Galactic Nuclei", *The Astrophysical Journal*, **915**, Issue 1, article id. 10, 11 pp. (2021), selected as an AAS featured article

247. A. Lupi, **Z. Haiman** & M. Volonteri, "Forming massive seed black holes in high-redshift quasar host progenitors", *Monthly Notices of the Royal Astronomical Society*, **503**, Issue 4, pp.5046-5060 (2021).

246. H. Tagawa, B. Kocsis, **Z. Haiman**, I. Bartos, K. Omukai & J. Samsing, "Mass Gap Mergers in Active Galactic Nuclei", *The Astrophysical Journal*, **908**, Issue 2, article id. 194, 11 pp. (2021).

245. H. Tagawa, B. Kocsis, **Z. Haiman**, I. Bartos, K. Omukai & J. Samsing, "Eccentric Black Hole Mergers in Active Galactic Nuclei", *The Astrophysical Journal (Letters)*, **907**, Issue 1, article id. L20, 9 pp. (2021).

244. J. Samsing, I. Bartos, D. J. D'Orazio, **Z. Haiman**, B. Kocsis, N. W. C. Leigh, B. Liu, M. E. Pessah, H. Tagawa, "Active Galactic Nuclei as Factories for Eccentric Black Hole Mergers", *Nature*, **603**, Issue 7900, pp. 237-240 (2022).

243. K. Osato, J. Liu & **Z. Haiman**, "κTNG: Effect of Baryonic Processes on Weak Lensing with IllustrisTNG Simulation", *Monthly Notices of the Royal Astronomical Society*, **502**, Issue 4, pp. 5593-5602 (2021).

242. J. Zrake, C. Tiede, A. MacFadyen, & **Z. Haiman**, "Equilibrium eccentricity of accreting binaries", *The Astrophysical Journal (Letters)*, **909**, Issue 1, article id. L13, 7 pp. (2021).

241. M. Safarzadeh & **Z. Haiman**, "Formation of GW190521 via gas accretion onto Population III stellar black hole remnants born in high-redshift minihalos", *The Astrophysical Journal (Letters)*, **903**, Issue 1, article id. L21, 5pp. (2020).

240. Y. Sakurai, **Z. Haiman** & K. Inayoshi,, "Radiative feedback for supermassive star formation in a massive cloud with H2 molecules in an atomic-cooling halo", *Monthly Notices of the Royal Astronomical Society*, **499**, pp. 5960-5971 (2020).

239. J. M. Zorrilla, M. Sharma, D. Hsu & **Z. Haiman**,, "Interpreting deep learning models for weak lensing", *Physical Review D*, **102**, Issue 12, article id.123506 (2020).

238. Y. Yang, V. Gayathri, I. Bartos, **Z. Haiman**, M. Safarzadeh & H. Tagawa, "Black Hole Formation in the Lower Mass Gap through Mergers and Accretion in AGN Disks", *The Astrophysical Journal (Letters)*, **901**, Issue 2, id.L34, 7 pp. (2020).

237. J. Regan, **Z. Haiman**, J. Wise, B. W. O'Shea & M. L. Norman, "Massive Star Formation in Metal-Enriched Haloes at High Redshift", *The Open Journal of Astrophysics*, **3**, issue 1, 11pp. (2020).

236. A. Derdzinski, D. D'Orazio, P. Duffell, **Z. Haiman**, A. MacFadyen, "Evolution of gas disc-embedded intermediate mass ratio inspirals in the LISA band", *Monthly Notices of the Royal Astronomical Society*, **501**, Issue 3, pp. 3540-3557 (2021).

235. C. Tiede, J. Zrake, A. MacFadyen & **Z. Haiman**, "Gas-driven inspiral of binaries in thin accretion disks", *The Astrophysical Journal*, **900**, Issue 1, id.43, 11 pp. (2020).

234. H. Tagawa, **Z. Haiman**, I. Bartos & B. Kocsis, "Spin Evolution of Stellar-mass Black Hole Binaries in Active Galactic Nuclei", *The Astrophysical Journal*, **899**, Issue 1, article id. 26 (2020).

233. Y. Yang, I. Bartos, **Z. Haiman**, B. Kocsis, S. Márka, H. Tagawa, "Cosmic Evolution of Stellar-mass Black Hole Merger Rate in Active Galactic Nuclei", *The Astrophysical Journal*, **896**, Issue 2, article id. 138 (2020).

232. E. Visbal, G. L. Bryan & **Z. Haiman**, "Self-consistent Semi-analytic Modeling of Feedback During Primordial Star Formation and Reionization", *The Astrophysical Journal*, **897**, Issue 1, article id.95 (2020).

231. M. L. Saade, D. Stern, M. Brightman, **Z. Haiman**, S. G. Djorgovski, D. D'Orazio, K. E. S. Ford, M. J. Graham, H. D. Jun, R. P. Kraft, B. McKernan, A. Vikhlinin, D. J. Walton "Chandra Observations of Candidate Sub-Parsec Binary Supermassive Black Holes" *The Astrophysical Journal*, **900**, Issue 2, id.148, 10 pp. (2020).

230. J. Wolcott-Green, **Z. Haiman** & G. L. Bryan, "Suppression of H2-cooling in protogalaxies aided by trapped Lyα cooling radiation", *Monthly Notices of the Royal Astronomical Society*, **500**, pp. 138-144 (2020).

229. C. Xin, M. Charisi, **Z. Haiman** & D. Schiminovich, "Correlation between Optical and UV Variability of Quasars", *Monthly Notices of the Royal Astronomical Society*, **495**, pp. 1403-1413 (2020).

228. H. Tagawa, **Z. Haiman** & B. Kocsis, "Formation and Evolution of Compact-object Binaries in AGN Disks", *The Astrophysical Journal*, **898**, Issue 1, id.25 (2020).

227. V. Gayathri, I. Bartos, **Z. Haiman**, S. Klimenko, B. Kocsis, S. Marka & Y. Yang, "GW170817A as a Hierarchical Black Hole Merger", *The Astrophysical Journal (Letters)*, **890,**, Issue 2, article id. L20 (2020)

226. P. C. Duffell, D. J. D'Orazio, A. Derdzinski, **Z. Haiman**, A. MacFadyen, A. L. Rosen & J. Zrake, "Circumbinary Disks: Accretion and Torque as a Function of Mass Ratio and Disk Viscosity", *The Astrophysical Journal*, **901**, Issue 1, id.25, 9 pp. (2020).

225. B. X. Hu, D. J. D'Orazio, **Z. Haiman**, K. L. Smith, B. Snios, M. Charisi & R. Di Stefano, "Spikey: A Search for Lensing Flares from SMBH Binaries", *Monthly Notices of the Royal Astronomical Society*, **495**, pp. 4061-4070 (2020).

224. J. M. Zorrilla, S. Waterval & **Z. Haiman**, "Optimizing simulation parameters for weak lensing analyses involving non-Gaussian observables", *The Astrophysical Journal*, **159**, Issue 6, id.284 (2020).

223. H. Tagawa, **Z. Haiman** & B. Kocsis, "Making a supermassive star by stellar bombardment", *The Astrophysical Journal*, **892**, Issue 1, id.36, 19 pp. (2020).

222. J. M. Zorrilla & **Z. Haiman**, "Probing gaseous galactic halos through the rotational kSZ effect", *Physical Review D*, **101**, Issue 8, article id.083016 (2020).

221. C. Xin, M. Charisi, **Z. Haiman**, M. J. Graham, D. Stern, D. J D'Orazio & D. Schiminovich, "Testing the relativistic Doppler boost hypothesis for the binary candidate quasar PG1302-102 with multi-band Swift data", *Monthly Notices of the Royal Astronomical Society*, **496**, 1683-1696 (2020).

220. Y. Yang, I. Bartos, V. Gayathri, S. Ford, **Z. Haiman**, S. Klimenko, B. Kocsis, Sz. Marka, Zs. Marka, B. McKernan & R. O'Shaugnessy, "Hierarchical Black Hole Mergers in Active Galactic Nuclei", *Physical Review Letters*, **123**, 181101 (2019); selected as Editors' Suggestion and as a "Featured in Physics" focus article.

219. T. Lu & **Z. Haiman**, "The matter fluctuation amplitude inferred from the weak lensing power spectrum and correlation function in CFHTLenS data", *Monthly Notices of the Royal Astronomical Society*, **490**, pp. 5033-5042 (2019).

218. Y. Yang, Bartos, **Z. Haiman**, B. Kocsis, Z. Marka, N.C. Stone, & S. Marka, "AGN Disks Harden the Mass Distribution of Stellar-mass Binary Black Hole Mergers", *The Astrophysical Journal*, **876**, Issue 2, article id. 122 (2019).

217. D. Ribli, B. A. Pataki, J. M. Zorrilla, D. Hsu, **Z. Haiman** & I. Csabai, "Weak lensing cosmology with convolutional neural networks on noisy data", *Monthly Notices of the Royal Astronomical Society*, **490**, pp. 1843-1860 (2019).

216. K. R. Corley, I. Bartos, L. Singer, A. Williamson, **Z. Haiman**, B. Kocsis, S. Nissanke, Z. Marka & S. Marka, "Localization of Binary Black-Hole Mergers with Known Inclination", *Monthly Notices of the Royal Astronomical Society*, **488**, pp. 4459-4463 (2019).

215. G. A. Marques, J. Liu, J. M. Zorrilla, **Z. Haiman**, A. Bernui & C. P. Novaes, "Constraining neutrino mass with weak lensing Minkowski Functionals", *Journal of Cosmology and Particle Physics*, Issue 06, article id. 019 (2019).

214. M. Abruzzo & **Z. Haiman**, "The Impact of Photometric Redshift Errors on Lensing Statistics in Ray-Tracing Simulations", *Monthly Notices of the Royal Astronomical Society*, **486**, pp. 2730-2753 (2019).

213. J. Wolcott-Green & **Z. Haiman**, "H2 self-shielding with non-LTE rovibrational populations: implications for cooling in protogalaxies", *Monthly Notices of the Royal Astronomical Society*, **484**, pp. 2467-2473 (2019).

212. A. Derdzinski, D. D'Orazio, P. Duffell, **Z. Haiman** & A. MacFadyen, "Probing gas disc physics with LISA: simulations of an intermediate mass ratio inspiral in an accretion disc", *Monthly Notices of the Royal Astronomical Society*, **486**, Issue 2, p.2754-2765 (2019).

211. C. Fontecilla, **Z. Haiman** & J. Cuadra, "Non-steady-state long-term evolution of supermassive black hole binaries surrounded by accretion discs", *Monthly Notices of the Royal Astronomical Society*, **482**, pp. 4383-4396 (2019).

210. L. Z. Kelley, **Z. Haiman**, A. Sesana & L. Hernquist, "Massive BH Binaries as Periodically-Variable AGN", *Monthly Notices of the Royal Astronomical Society*, **485**, pp. 1579-1594 (2019).

209. E. Visbal & **Z. Haiman**, "Identifying Direct Collapse Black Hole Seeds through their Small Host Galaxies", *The Astrophysical Journal (Letters)*, **865**, issue 1, article id. L9, (2018).

208. K. Inayoshi, K. Ichikawa & **Z. Haiman**, "Gravitational waves from supermassive black hole binaries in ultra-luminous infrared galaxies", *The Astrophysical Journal (Letters)*, **863**, issue 2, article id. L36, (2018).

207. K. Inayoshi, M. Li & **Z. Haiman**, "Massive black hole and Population III galaxy formation in overmassive dark-matter haloes with violent merger histories", *Monthly Notices of the Royal Astronomical Society*, **479**, pp. 4017-4027 (2018).

206. A. Gupta, J. M. Zorrilla Matilla, D. Hsu & **Z. Haiman**, "Non-Gaussian information from weak lensing data via deep learning", *Physical Review D*, **97**, Issue 10, id. 103515 (2018).

205. M. Charisi, **Z. Haiman**, D. Schiminovich & D. J. D'Orazio, "Testing the relativistic Doppler boost hypothesis for supermassive black hole binary candidates", *Monthly Notices of the Royal Astronomical Society*, **476**, pp. 4617-4628 (2018).

204. T. Tang, A. MacFadyen & **Z. Haiman**, "The late inspiral of supermassive black hole binaries with circumbinary gas discs in the LISA band", *Monthly Notices of the Royal Astronomical Society*, **476**, pp. 2249-2257 (2018).

203. J. Liu, S. Bird, J. M. Zorrilla, J. C. Hill, **Z. Haiman**, M. S. Madhavacheril, A. Petri & D. N. Spergel, "MassiveNuS: Cosmological Massive Neutrino Simulations", *Journal of Cosmology and Particle Physics*, , Issue 03, id. 049 (2018).

202. K. Inayoshi, J. P. Ostriker, **Z. Haiman** & R. Kuiper, "Low density, radiatively inefficient rotating accretion flow onto a black hole", *Monthly Notices of the Royal Astronomical Society*, **476**, pp. 1412-1426 (2018).

201. Z. Penoyre & **Z. Haiman**, "A Drop in the Pond: The Effect of Rapid Mass Loss on the Dynamics and Interaction Rate of Collisionless Particles", *Monthly Notices of the Royal Astronomical Society*, **473**, pp. 498-512 (2018).

200. T. Ryu, R. Perna, **Z. Haiman**, J. P. Ostriker & N. C. Stone, "Interactions between multiple supermassive black holes in galactic nuclei: a solution to the final parsec problem", *Monthly Notices of the Royal Astronomical Society*, **473**, pp. 3410-3433 (2018).

199. J. M. Zorrilla, **Z. Haiman**, A. Petri & T. Namikawa, "Geometry and growth contributions to cosmic shear observables", *Physical Review D*, **96**, Issue 02, id. 0235133 (2017).

198. E. Visbal, **Z. Haiman** & G. L. Bryan " Self-consistent semi-analytic models of the first stars" *Monthly Notices of the Royal Astronomical Society*, **475**, pp. 5246-5256 (2018).

197. **Z. Haiman**, "The electromagnetic chirp of a compact binary black hole: a phase template for the gravitational wave inspiral", *Physical Review D*, **96**, Issue 2, id. 023004 (2017).

196. N.W.C. Leigh, A.M. Geller, B. McKernan, K.E.S. Ford, J. Bellovary, S. Endlich, **Z. Haiman**, B. Kocsis, W. Lyra, M.-M. Mac Low, "On the rate of black hole mergers in galactic nuclei and active galactic nucleus disks II. Dynamical hardening", *Monthly Notices of the Royal Astronomical Society*, **474**, pp. 5672-5683 (2018).

195. A. Sesana, **Z. Haiman**, B. Kocsis & L. Z. Kelley, "Testing the binary hypothesis: pulsar timing constrains on supermassive black hole binary candidates", *The Astrophysical Journal*, **856**, article id. 42, 14 pp. (2018).

194. J. Regan, E. Visbal, J. H. Wise, **Z. Haiman**, P. H. Johansson & G. L. Bryan, "Rapid Formation of Massive Black Holes in close proximity to Embryonic Proto-Galaxies", *Nature Astronomy*, **1**, article no. 0075, March (2017).

193. T. Tang, A. MacFadyen & **Z. Haiman**, "On the orbital evolution of supermassive black hole binaries with circumbinary accretion discs", *Monthly Notices of the Royal Astronomical Society*, **469**, pp. 4258-4267 (2017).

192. K. Inayoshi, N. Tamanini, C. Caprini & **Z. Haiman**, "Probing stellar binary black hole formation in galactic nuclei via the imprint of their center of mass acceleration on their gravitational wave signal", *Physical Review D*, **96**, Issue 6, id. 063014 (2017).

191. D. J. D'Orazio & **Z. Haiman**, "Lighthouse in the dust: infrared echoes of periodic emission from massive black hole binaries", *Monthly Notices of the Royal Astronomical Society*, **470**, pp. 1198-1217 (2017).

190. I. Bartos, **Z. Haiman**, Z. Marka, B. D. Metzger, N. C. Stone, & S. Marka, "Gravitational-Wave Localization Alone Probes AGN Origin of Stellar-Mass Black Hole Mergers", *Nature Communications*, **8**, No. 1, Article No. 831 (2017).

189. E. Visbal, **Z. Haiman** & G. L. Bryan, "What is the Maximum Mass of a Population III Galaxy?", *Monthly Notices of the Royal Astronomical Society*, **469**, pp. 1456-1465 (2017).

188. A. Petri, **Z. Haiman** & M. May, "On the validity of the Born approximation for beyond-Gaussian weak lensing observables", *Physical Review D*, **95**, Issue 12, id. 123503 (2017).

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