

Claudia Cicone – Curriculum Vitae

Personal information

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Nationality: Italian
Languages: Italian, English, Spanish

Employment

Oct 2016 – present Marie Skłodowska-Curie Fellow (AstroFIT2 grant), INAF – OABrera (Italy)
May 2015 – Aug 2016 Postdoctoral researcher, ETH Zurich, Institute for Astronomy (Switzerland)

Education

Jan 2012 – Oct 2015 PhD in Physics, University of Cambridge, Cavendish Laboratory and Kavli Institute for Cosmology, Cambridge (UK)
Thesis: “Outflows as Feedback Mechanism in Galaxies”
Supervisor: Prof. Roberto Maiolino

Sep 2009 – Sep 2011 Laurea magistrale di dottore in Astronomia e Astrofisica (Equivalent to: Master of Science in Astronomy and Astrophysics), Sapienza - Università di Roma, Rome (Italy)
Grade: 110/110 cum laude
Thesis: “Observations of AGN Feedback on the Host Galaxy”
Supervisor: Prof. Fabrizio Fiore

Mar 2011 – Dec 2012 Graduate student at INAF - Osservatorio Astronomico di Roma (INAF-OAR)

Sep 2006 – Sep 2009 Laurea di primo livello in Fisica e Astrofisica (Equivalent to: Bachelor of Science in Physics and Astrophysics), Sapienza - Università di Roma, Rome (Italy)
Grade: 110/110 cum laude
Thesis: “La fisica dei quasar con righe di assorbimento larghe (BAL QSOs)”
Supervisor: Prof. Dario Trevese

Sep 2001– Sep 2006 Diploma di maturità scientifica (Scientific High School degree), Liceo Scientifico Statale Augusto Righi, Rome (Italy), Grade: 100/100
Jan 2005 – Mar 2005 Visiting student at Greenhills School, Ann Arbor (Michigan)

Research grants, awards, and honours

Sep 2017 Special mention at “Premio Giuseppe Lorenzoni” for the best scientific article in Astrophysics 2014-2016

Jun 2017 Funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 730562 [RadioNet]

Oct 2016 – Sep 2019 European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 664931

Sep 2015 MERAC funding and travel award, awarded by the Société Suisse d'Astrophysique et d'Astronomie

Apr 2013 – Mar 2015 Isaac Newton studentship, awarded by the University of Cambridge (UK)

Apr 2013 – Mar 2015 United Kingdom science and technology facilities council (STFC) funding

Sep 2011 Summa cum laude Master degree in Astronomy and Astrophysics, Sapienza – Università di Roma

Sep 2009 Summa cum laude Bachelor degree in Physics and Astrophysics, Sapienza – Università di Roma

Sep 2008 “Percorso di eccellenza” award, established by Sapienza – Università di Roma

Areas of expertise

Galaxy formation and evolution

- Multi-phase (ionised/atomic/molecular) galactic outflows
- Ultra luminous and luminous infrared galaxies ((U)LIRGs)
- Feedback from active galactic nuclei (AGN) and star formation
- Early universe and high-redshift AGN
- Interstellar and circumgalactic medium (ISM, CGM)
- Surveys of molecular and atomic gas in local galaxies
- Galaxy scaling relations
- Dual and binary AGN

Observations and data analysis at sub-millimetre, millimetre and radio wavelengths

- Interferometry
- Single-dish observations

Analysis of optical spectroscopic and photometric data

- Stacking and fitting techniques
- Use of large catalogues and datasets (e.g. SDSS)

Refereed journal publication statistics (last update: 14-Sep-2018)

Author of 29 refereed publications on international journals, including seven as first author. H-index (refereed publications only) = 17, total number of citations = 1360 (of which >500 in first author papers).

Observing experience

- Mar 2014 – present Expert observer for the Atacama Pathfinder EXperiment (APEX), six observing runs during the European Southern Observatory (ESO) time, over 600 hours of observations. APEX instruments used: heterodyne receivers (APEX-1, APEX-2, APEX-3, FLASH+, SEPIA-Band 5, SEPIA-Band 9, PI230), bolometer arrays (LABOCA, ARTEMIS). Data quality check and analysis performed using CLASS, BoA, and CRUSH softwares. Experience with preparation, validation, and submission of APEX heterodyne datasets for ESO Phase 3 archive
- Dec 2015 - present Remote observer at the ARO 12m radio telescope (Kitt Peak, Arizona). Several observing runs for the MASCOT ESO large programme (>50h of observations).
- Feb 2018 Visitor observer at the New Technology Telescope (NTT), La Silla Observatory, five nights. Optical photometry and spectroscopy using EFOSC2

Accepted telescope proposals

- Principal Investigator ALMA and ACA, APEX (ESO time), JVLA, NOEMA/IRAM PdBI
- Co-Investigator ALMA and ACA, APEX (ESO and Swedish time, inc. two ESO large programmes), ARO-12m (ESO large programme), NOEMA/IRAM PdBI, JVLA, IRAM 30m, European VLBI, ESO (MUSE, SINFONI, FORS2, EFOSC2, X-Shooter), Chandra X-ray observatory, GMRT, SWIFT

Large collaboration memberships

- July 2017 – present LSST AGN Science Collaboration

Professional service

- Regular referee for Nature, ApJ, MNRAS, A&A
- Member of the science case working group for the Atacama Large-Aperture Submm/mm Telescope (AtLAST) since July 2017. Leader of the AtLAST CGM science case working group since Sep 2018.
- SOC member, “What matter(s) between galaxies”, to be held in Spineto (Italy), June 2018
- LOC member, “AGN13: The Beauty and the Beast”, to be held in Milano (Italy), Oct. 2018
- SOC member, “What matter(s) around galaxies”, held in Durham (UK), June 2017
- SOC member, “Sweeping galaxies clean” workshop, held in Sesto (Italy), Feb 2016
- Invited speaker for the special session on APEX operations at the ESO Users’ Committee 40th annual meeting, held on 18-19 April 2016 at the ESO Headquarters in Garching

Teaching

- Feb 2016 – June 2016 Teaching assistant for Physics laboratory (Physikpraktikum AP), ETH Zurich
Nov 2015 Series of lectures on radio and sub-millimetre/millimetre astronomy for the Master course “Observational techniques in astrophysics”, ETH Zurich
- Sep 2015 – Dec 2015 Teaching assistant for advanced Physics laboratory (Physikpraktikum VP), ETH Zurich
- May 2015 – Sep 2016 Co-supervisor of Andrin Flütsch, Semester project for Master degree and Master thesis project at ETH Zurich (Master thesis in collaboration with Prof. Serena Viti at University College London, UK), currently PhD student at the Cavendish Laboratory (Cambridge, UK)

Invited colloquia

- Oct 2018 Max-Planck-Institut für Radioastronomie, Bonn (Germany)
Jan 2018 School of Physics and Astronomy, Cardiff University (UK)
May 2017 ESO Headquarters, Garching bei München (Germany)
May 2017 Universidad Diego Portales (Chile)
May 2017 Joint ALMA Observatory (Chile)
May 2017 Pontificia Universidad Católica de Chile (Chile)
Mar 2017 ASTRON-JIVE, Dwingeloo (The Netherlands)
Feb 2017 Osservatorio Astrofisico di Arcetri, Firenze (Italy)
Mar 2016 Academy of Athens, Athens (Greece)
Oct 2015 ESO/JAO Vitacura, Santiago (Chile)
Feb 2015 University of Sheffield, Sheffield (UK)
Dec 2014 Osservatorio Astronomico di Trieste (INAF-OAT), Trieste (Italy)
Oct 2014 Universidad de Concepción (UDEEC), Concepción (Chile)

Conference and workshop participation

- Sep 2018 AtLAST II Science, Edinburgh (UK), Contributed talk
July 2018 Multiphase AGN Feeding & Feedback, Sesto (Italy), Invited talk
Apr 2018 EWASS 2018, Liverpool (UK), Invited talk
Mar 2018 Science with APEX 2018 workshop, Schloss Ringberg (Germany), Talk contribution
Jan 2018 AtLAST 2018: a workshop to discuss science/technical aspects of the AtLAST, ESO-HQ (Germany), Extragalactic science working group member
Oct 2017 Reality and Myths of AGN feedback, Lorentz Center, Leiden (The Netherlands), Invited review talk
Sep 2017 LXI Congresso della Società Astronomica Italiana, Invited talk
July 2017 Whereabouts and Physics of the Roaming Baryons in the Universe, Sesto (Italy), Invited talk
July 2017 Behind the Curtain of Dust II, Sesto (Italy), Invited talk
June 2017 What Matter(s) Around Galaxies, Durham (UK), Invited talk and SOC member
Mar 2016 Science with the Atacama Pathfinder EXperiment (APEX) workshop, Schloss Ringberg (Germany), Talk contribution
Feb 2016 Sweeping galaxies clean: cold molecular outflows as drivers of galaxy evolution, Sesto/Sexten (Italy), Invited talk and SOC member
Aug 2015 IAU XXIX General Assembly, Honolulu (Hawaii), Invited talk
Jan 2015 ESO in the 2020s, ESO-HQ (Germany), Talk contribution
Jul 2014 Behind the curtain of dust, Sesto (Italy), Invited talk
Jun 2014 The Unquiet Universe, Cefalú (Italy), Talk contribution
Mar 2014 3D2014 Gas and stars in galaxies, ESO-HQ (Germany), Talk contribution
Sep 2013 Galaxy evolution over five decades, Cambridge (UK), Talk contribution
Jul 2013 9th Marseille Cosmology Conference, Aix-en-Provence (FR), Talk contribution
Jul 2013 EWASS 2013, Turku (Finland), Talk contribution
May 2013 Science with ALMA Band 2 workshop, Bologna (Italy), Invited Talk
Jul 2012 EWASS 2012, Rome (Italy), Poster contribution

May 2010 AGN 9, Ferrara (Italy), Poster contribution

Departmental talks

Mar 2018 INAF – Osservatorio Astronomico di Brera, Merate (Italy)
Mar 2017 INAF – Osservatorio Astronomico di Brera, Milano (Italy)
Nov 2015 Institute for Astronomy, ETH Zurich, Zurich (Switzerland)
Feb 2015 Kavli Institute for Cosmology (KICC), Cambridge (UK)
Mar 2014 Institute of Astronomy, Cambridge (UK)
Jun 2013 Kavli Institute for Cosmology (KICC), Cambridge (UK)

Outreach activities

Oct 2015 APEX telescope open day, Sequitor, San Pedro de Atacama (Chile)
Mar 2013 IoA open day, University of Cambridge, Cambridge (UK)
Sep 2012 Physics at work 2012 exhibition, University of Cambridge, Cambridge (UK)

Press and media

Mar 2018 INAF press release based on Cicone et al. 2018, Nature Astronomy, 2, 176.
<http://www.media.inaf.it/2018/03/01/parola-al-vento/>

May 2017 ESO Phase 3 data release of the ALLSMOG survey data products. ESO announcement: <http://archive.eso.org/cms/eso-archive-news/release-of-co-2-1-spectra-from-allsmog.html>

May 2017 INAF and SKA organization press releases based on Cicone et al. 2017, A&A, 604, A53. <http://www.media.inaf.it/2017/05/18/identikit-di-galassie-piccole-e-vicine-con-allsmog/>; <https://www.skatelescope.org/news/international-team-completes-large-survey-of-gas-in-galaxies/>

Jan 2015 University of Cambridge press release based on Cicone et al. 2015, A&A, 574, A14 (<http://www.cam.ac.uk/research/news/galactic-hailstorm-in-the-early-universe>)

Claudia Cicone – Full list of publications

Refereed publications

- G. Venturi, E. Nardini, A. Marconi, S. Carniani, M. Mingozi, G. Cresci, F. Mannucci, G. Risaliti, R. Maiolino, B. Balmaverde, A. Bongiorno, M. Brusa, A. Capetti, C. Cicone, S. Ciroi, C. Feruglio, F. Fiore, A. Gallazzi, F. La Franca, V. Mainieri, K. Matsuoka, T. Nagao, M. Perna, E. Piconcelli, E. Sani, P. Tozzi, S. Zibetti. The MAGNUM survey: a MUSE-Chandra resolved view on ionized outflows and photoionization in the Seyfert galaxy NGC1365. Accepted for publication in A&A in Sep 2018. ArXiv: 1809.01206.
- C. Circosta, V. Mainieri, P. Padovani, G. Lanzuisi, M. Salvato, C. M. Harrison, D. Kakkad, A. Puglisi, G. Vietri, G. Zamorani, C. Cicone, B. Husemann, C. Vignali, B. Balmaverde, M. Bischetti, M. Brusa, A. Bongiorno, S. Carniani, F. Civano, A. Comastri, G. Cresci, C. Feruglio, F. Fiore, S. Fotopoulou, A. Karim, A. Lamastra, B. Magnelli, F. Mannucci, A. Marconi, A. Merloni, H. Netzer, M. Perna, E. Piconcelli, G. Rodighiero, E. Schinnerer, M. Schramm, A. Schulze, J. Silverman, L. Zappacosta. SUPER I. Towards an unbiased study of ionized outflows in $z \sim 2$ active galactic nuclei: survey overview and sample characterization. Accepted for publication in A&A in Sep 2018. ArXiv: 1809.04858.
- C. Cicone, P. Severgnini, P. P. Papadopoulos, R. Maiolino, C. Feruglio, E. Treister, G. C. Privon, Z. Zhang, R. Della Ceca, F. Fiore, K. Schawinski, J. Wagg. ALMA [CI]³P₁₋₃P₀ observations of NGC 6240: a puzzling molecular outflow, and the role of outflows in the global α_{CO} factor of (U)LIRGs. ApJ, 863, 143, Aug 2018.
- P. Severgnini, C. Cicone, R. Della Ceca, V. Braitto, A. Caccianiga, L. Ballo, S. Campana, A. Moretti, V. La Parola, C. Vignali, A. Zaino, G. Matzeu, M. Landoni. Swift data hint at a binary Super massive black hole candidate at sub-parsec separation. MNRAS, 479, p.3804-3813, Sep 2018.
- V. Braitto, J. N. Reeves, G. A. Matzeu, P. Severgnini, L. Ballo, A. Caccianiga, S. Campana, C. Cicone, R. Della Ceca, T. J. Turner. A new powerful and highly variable disk wind in an AGN-star forming galaxy, the case of MCG-03-58-007. MNRAS, 479, p.3592-3603 Sep 2018.
- G. Castignani, F. Combes, P. Salomé, S. Andreon, M. Pannella, I. Heywood, G. Trinchieri, C. Cicone, L. J. M. Davies, F. N. Owen, A. Raichoor. Molecular gas in two companion cluster galaxies at $z=1.2$. Accepted for publication in A&A in June 2018. arXiv: 1806.01826.
- F. G. Saturni, M. Bischetti, E. Piconcelli, A. Bongiorno, C. Cicone, C. Feruglio, F. Fiore, S. Gallerani, M. Giustini, S. Piranomonte, G. Vietri, C. Vignali. The rest-frame UV-to-optical spectroscopy of APM 08279+5255. Accepted for publication in A&A in Apr. 2018. arXiv:1804.10038.
- C. Cicone, M. Brusa, C. Ramos Almeida, G. Cresci, B. Husemann, V. Mainieri. The largely unconstrained multi-phase nature of outflows in AGN host galaxies. Invited Comment (reviewed by Editor), Nature Astronomy, 2, 176-178, March 2018.
- P. Barai, S. Gallerani, A. Pallottini, A. Ferrara, A. Marconi, C. Cicone, R. Maiolino, S. Carniani. Quasar outflows at $z \geq 6$: the impact on the host galaxies. MNRAS, 473, p.4003-4020, Jan 2018.
- C. Feruglio, A. Ferrara, M. Bischetti, D. Downes, R. Neri, C. Ceccarelli, C. Cicone, F. Fiore, S. Gallerani, R. Maiolino, N. Menci, E. Piconcelli, G. Vietri, C. Vignali, L. Zappacosta. On the discovery of fast molecular gas in the UFO/BAL quasar APM08279+5255 at $z=3.912$. A&A, 608, A30, 9pp, Dec 2017.
- S. Carniani, A. Marconi, R. Maiolino, C. Feruglio, M. Brusa, G. Cresci, M. Cano-Díaz, C. Cicone, B. Balmaverde, F. Fiore, A. Ferrara, S. Gallerani, F. La Franca, V. Mainieri, F. Mannucci, H. Netzer, E. Piconcelli, E. Sani, R. Schneider, O. Shemmer, L. Testi. AGN feedback on molecular gas reservoirs in quasars at $z \sim 2.4$. A&A, 605:A105, 14 pp., Sep 2017.
- C. Cicone, M. Bothwell, J. Wagg, P. Moller, C. De Breuck, Z. Zhang, S. Martin, R. Maiolino, P. Severgnini, M. Aravena, F. Belfiore, D. Espada, A. Flutsch, V. Impellizzeri, Y. Peng, M. A. Raj, N. Ramirez-Olivencia, D. Riechers, K. Schawinski. The final data release of ALLSMOG: a survey of CO in typical local low- M^* star-forming galaxies. A&A, 604:A53, 45 pp., Aug 2017.

- F. Fiore, C. Feruglio, F. Shankar, M. Bischetti, A. Bongiorno, M. Brusa, S. Carniani, C. Cicone, F. Duras, A. Lamastra, V. Mainieri, A. Marconi, N. Menci, R. Maiolino, E. Piconcelli, G. Vietri, L. Zappacosta. AGN wind scaling relations and the co-evolution of black holes and galaxies. *A&A*, 601, A143, 21 pp., May 2017.
- B. Trakhtenbrot, P. Lira, H. Netzer, C. Cicone, R. Maiolino, O. Shemmer. ALMA Observations Show Major Mergers Among the Host Galaxies of Fast-growing, High-redshift Supermassive Black Holes. *ApJ*, 836, 8, 21 pp., Feb 2017.
- M. Bothwell, R. Maiolino, C. Cicone, Y. Peng, J. Wagg. Galaxy metallicities depend primarily on stellar mass and molecular gas mass. *A&A*, 595, A48, 5 pp., Oct 2016.
- S. Carniani, A. Marconi, R. Maiolino, B. Balmaverde, M. Brusa, M. Cano-Diaz, C. Cicone, A. Comastri, G. Cresci, F. Fiore, C. Feruglio, F. La Franca, V. Mainieri, F. Mannucci, T. Nagao, H. Netzer, E. Piconcelli, G. Risaliti, R. Schneider, O. Shemmer. Fast outflows and star formation quenching in quasar host galaxies, *A&A*, 591:A28, 9 pp., Jun 2016.
- C. Cicone, R. Maiolino, and A. Marconi. Outflows and complex stellar kinematics in SDSS star-forming galaxies. *A&A*, 588:A41, 27 pp., Apr 2016.
- M. Bothwell, R. Maiolino, Y. Peng, C. Cicone, H. Griffith, J. Wagg. Molecular gas as the driver of fundamental galactic relations. *MNRAS*, 455, 2, p.1156-1170, Jan 2016.
- C. Feruglio, F. Fiore, S. Carniani, E. Piconcelli, L. Zappacosta, A. Bongiorno, C. Cicone, R. Maiolino, A. Marconi, N. Menci, S. Puccetti, S. Veilleux. AGN-driven winds on all scales in Markarian 231: from hot nuclear ultra-fast up to kpc-extended molecular outflow. *A&A*, 583: A99, 16 pp., Nov 2015.
- G. Cresci, A. Marconi, S. Zibetti, G. Risaliti, S. Carniani, F. Mannucci, A. Gallazzi, R. Maiolino, B. Balmaverde, M. Brusa, A. Capetti, C. Cicone, C. Feruglio, J. Bland-Hawthorn, T. Nagao, E. Oliva, M. Salvato, E. Sani, P. Tozzi, T. Urrutia, G. Venturi. The MAGNUM survey: Positive feedback in the nuclear region of NGC 5643 suggested by MUSE. *A&A*, 582: A63, 9 pp., Oct 2015.
- S. Carniani, A. Marconi, R. Maiolino, B. Balmaverde, M. Brusa, M. Cano-Diaz, C. Cicone, A. Comastri, G. Cresci, F. Fiore, C. Feruglio, F. La Franca, V. Mainieri, F. Mannucci, T. Nagao, H. Netzer, E. Piconcelli, G. Risaliti, R. Schneider, O. Shemmer. Ionised outflows in $z \sim 2.4$ quasar host galaxies. *A&A*, 580: A102, 13 pp., Aug 2015.
- C. Cicone, R. Maiolino, S. Gallerani, R. Neri, A. Ferrara, E. Sturm, F. Fiore, E. Piconcelli, and C. Feruglio. Very extended cold gas, star formation and outflows in the halo of a bright quasar at $z > 6$. *A&A*, 574:A14, 21 pp., Feb 2015.
- M. S. Bothwell, J. Wagg, C. Cicone, R. Maiolino, P. Moller, M. Aravena, C. De Breuck, Y. Peng, D. Espada, J.A. Hodge, C. M. V. Impellizzeri, S. Martin, D. Riechers, F. Walter. ALLSMOG: an APEX Low-redshift Legacy Survey for MOlecular Gas. I - Molecular gas scaling relations, and the effect of the CO/H₂ conversion factor. *MNRAS*, 445:2599-2620, Dec 2014.
- C. Cicone, R. Maiolino, E. Sturm, J. Gracia-Carpio, C. Feruglio, R. Neri, S. Aalto, R. Davies, F. Fiore, J. Fischer, S. Garcia-Burillo, E. Gonzalez-Alfonso, S. Hailey-Dunsheath, E. Piconcelli, and S. Veilleux. Massive molecular outflows and evidence for AGN feedback from CO observations. *A&A*, 562:A21, 25 pp., Feb 2014.
- C. Feruglio, F. Fiore, E. Piconcelli, C. Cicone, R. Maiolino, R. Davies, and E. Sturm. High resolution mapping of CO(1-0) in NGC 6240. *A&A*, 558:A87, 7 pp., Oct 2013.
- M. S. Bothwell, R. Maiolino, R. Kennicutt, G. Cresci, F. Mannucci, A. Marconi, and C. Cicone. A fundamental relation between the metallicity, gas content and stellar mass of local galaxies. *MNRAS*, 433:1425-1435, Aug 2013.
- C. Feruglio, F. Fiore, R. Maiolino, E. Piconcelli, H. Aussel, D. Elbaz, E. Le Floc'h, E. Sturm, R. Davies, and C. Cicone. NGC 6240: extended CO structures and their association with shocked gas. *A&A*, 549:A51, 8pp., Jan 2013.
- R. Maiolino, S. Gallerani, R. Neri, C. Cicone, A. Ferrara, R. Genzel, D. Lutz, E. Sturm, L. J. Tacconi, F. Walter, C. Feruglio, F. Fiore, and E. Piconcelli. Evidence of strong quasar feedback in the early Universe. *MNRAS*, 425:L66-L70, Sep 2012.

- C. Cicone, C. Feruglio, R. Maiolino, F. Fiore, E. Piconcelli, N. Menci, H. Aussel, and E. Sturm. The physics and the structure of the quasar-driven outflow in Mrk 231. *A&A*, 543:A99, 7 pp., Jul 2012.

Submitted manuscripts:

- A. Fluetsch, R. Maiolino, S. Carniani, A. Marconi, C. Cicone, M. A. Bourne, T. Costa, A. C. Fabian, W. Ishibashi, G. Venturi. Cold molecular outflows in the local Universe. Submitted to *MNRAS* in May 2018. ArXiv: 1805.05352.
- G. Matzeu, V. Braitto, J. N. Reeves, P. Severgnini, L. Ballo, A. Caccianiga, S. Campana, C. Cicone, R. Della Ceca, M. L. Parker, M. Santos-Lleo, N. Scharrel. Evidence of a clumpy disc-wind in the star forming Seyfert 2 galaxy MCG-03-58-007. Submitted to *MNRAS* in Aug. 2018.

Unrefereed Publications and conference proceedings

- B. Trakhtenbrot, P. Lira, H. Netzer, C. Cicone, R. Maiolino, O. Shemmer. Fast-growing SMBHs in Fast-growing Galaxies, at High Redshifts: the Role of Major Mergers as Revealed by ALMA. *Frontiers in Astronomy and Space Sciences*, Volume 4, id.49, November 2017.
- M. Bothwell, C. Cicone, J. Wagg, C. De Breuck. ALLSMOG, the APEX Low-redshift Legacy Survey for MOlecular Gas. *ESO, The Messenger*, vol. 169, p.38-41. September 2017.
- G. A. Fuller, C. De Breuck, S. Longmore, J. Wagg, L. Hunt, C. Cicone, P. Caselli, S. Viti, I. Jimenez-Serra, D. Vergani, S. Ramstedt, A. Richards, A. Avison, V. Casasola, M. Massardi, F. Costagliola, L. Testi, M. Beltran, R. Laing. The Science Case for ALMA Band 2. July 2014. eprint arXiv:1602.02414