

Curriculum Vitae

Datos personales

Nombre completo: *Julio Angel Fernández Alves*

Fecha y lugar de nacimiento: 5/4/1946, Montevideo, Uruguay

Estudios y cargos desempeñados

- Licenciado en Astronomía (1974, Facultad de Humanidades y Ciencias, Universidad de la República, Montevideo, Uruguay)
- Asistente, Departamento de Astronomía y Física, Facultad de Humanidades y Ciencias (1970-1976)
- Becario, Observatorio Astronómico de Madrid, España (1979)
- Investigador Visitante, Max-Planck Institut fr Aeronomie y Max- Planck Institut fr Kernphysik, República Federal de Alemania (1980-1983)
- Profesor Visitante, Observatorio do Valongo, Universidad Federal de Rio de Janeiro, Brasil (1984-1986)
- Profesor Titular, Facultad de Ciencias, Universidad de la República, Montevideo (1987-2020)
- Decano de la Facultad de Ciencias (2005-2010)

Membresía de academias y sociedades científicas

- Academia Nacional de Ciencias del Uruguay (ANCIU)
- National Academy of Sciences, USA
- Third World Academy of Sciences
- Academia de Ciencias de América Latina
- International Astronomical Union (IAU)
- Presidente de la Comisión 20 Positions and Motions of Minor Planets, Comets and Satellites de la IAU (por el trienio 2006-2009)
- Miembro del Working Group for the Small Bodies Nomenclature de la IAU (desde 1997 a la fecha)

- Sociedad Uruguaya de Astronomía
- Sociedad Uruguaya de Física

Honores y distinciones

- Premio Morosoli de Plata en Ciencia y Tecnología, Fundación Lolita Rubial (2016)
- Gerard P. Kuiper prize, Division for Planetary Sciences, American Astronomical Society (2018)
- Doctor Honoris Causa, Universidad de la República (2018)
- Investigador Grado 5 del PEDECIBA
- Investigador Nivel III del Sistema Nacional de Investigadores
- El asteroide 5996 fue designado Julioangel por la International Astronomical Union (Resolución Julio/1996)

Líneas de investigación

Mi trabajo ha estado relacionado fundamentalmente con la formación del sistema solar y la evolución física y dinámica de los planetas menores (asteroides, cometas y objetos transneptunianos). Se consideran que estos objetos son los más primitivos del sistema solar que quedaron como residuos después de la formación de los planetas, por lo que su estudio tiene relevancia para comprender los procesos de acreción en el disco protoplanetario que rodeaba al Sol primitivo. Entre los resultados más importantes de mi trabajo puedo mencionar: (1) Los denominados cometas de la familia de Jupiter (períodos orbitales < 20 años y constantes de Tisserand $2 < T < 3$) deberán provenir de un disco transneptuniano (Fernández 1980 MNRAS 192, 481), resultado que fue confirmado varios años después; (2) la mayoría de los cometas de la nube de Oort se formaron en la región de Urano-Neptuno, desde donde fueron dispersados en órbitas cuasi-parabólicas por las perturbaciones gravitatorias de los planetas gigantes (Fernández 1980 Icarus 42, 406); (3) Se demostró que los planetas gigantes experimentaron una migración radial durante su acreción (Fernández & Ip 1984 Icarus 58, 109). Este fenómeno de migración planetaria ha atraído mucha atención en años recientes en relación al descubrimiento de exoplanetas muy próximos a sus estrellas centrales; (5) el desarrollo de un modelo de formación del sistema solar dentro de un cúmulo estelar abierto, como se observa en la mayoría de las estrellas, de modo tal que la estructura de la nube de cometas de Oort que rodea al sistema solar fue moldeada por las perturbaciones gravitacionales de las estrellas vecinas miembros del cúmulo (Fernández 1997 Icarus 129, 106); (6)

La determinación de masas de cometas de largo período basada en la fuerza nogravitacional que actúa sobre los núcleos cometarios (esta fuerza es debida al impulso neto que recibe el cometa por la emisión asimétrica de los gases producidos en la sublimación de volátiles) (Sosa & Fernández 2011 Not. R. Astron. Soc. 416, 767).

Publicaciones

Papers científicos

Fernández, J.A., Horjales, E., Zamalvide, C. (1976). “Critical remarks to some theories on the origin of planetary rotation”, Pub. No. 45 Depto. Astronomía y Física, Montevideo.

Fernández, J.A. (1977). “On the correlation between rotational velocities of the components of visual binaries”, Rev. Mex. Astron. Astrof. 2 No.2, 53-57.

Fernández, J.A., Zamalvide, C. (1978). Gravitational capture of particles by a protoplanet, Rev. Mat. Fís. Teor. Tucuman 27, 55-67.

Fernández, J.A. (1978). “Mass removed by the outer planets in the early solar system”, Icarus 34, 173-181.

Fernández, J.A., Salgado, C. (1980). “Photometric study of the southern open cluster NGC 3532”, Astron. Astrophys. Suppl. Ser. 39, 11-18.

Fernández, J.A. (1980). “On the existence of a comet belt beyond Neptune”, Mon. Not. R. Astr. Soc. 192, 481-491.

Fernández, J.A. (1980). “Evolution of comet orbits under the perturbing influence of the giant planets and nearby stars”, Icarus 42, 406-421.

Fernández, J.A. (1981). “New and evolved comets in the solar system”, Astron. Astrophys. 96, 26-35.

Fernández, J.A. (1981). “On the observed excess of retrograde orbits among long period comets”, Mon. Not. R. Astr. Soc. 197, 265-273.

Fernández, J.A. (1981). “The role of collisions with interplanetary particles in the physical evolution of comets”, The Moon and the Planets 25, 507-519.

Fernández, J.A., Ip, W.-H. (1981). “Dynamical evolution of a cometary swarm in the outer planetary region”, Icarus 47, 470-479.

- Fernández, J.A. (1982). “Dynamical aspects of the origin of comets”, *Astron. J.* 87, 1318-1332.
- Fernández, J.A., Jockers, K. (1983). “Origin and nature of comets”, *Reports on Progress in Physics* 46, 665-772.
- Fernández, J.A., Ip, W.-H. (1983). “On the time evolution of the cometary influx in the region of the terrestrial planets”, *Icarus* 54, 377-387.
- Fernández, J.A., Ip, W.-H. (1984). “Some dynamical aspects of the accretion of Uranus and Neptune: The exchange of orbital angular momentum with planetesimals”, *Icarus* 58, 109-120.
- Fernández, J.A. (1984). “On the distribution of the perihelion distances of short-period comets”, *Astron. Astrophys.* 135, 129-134.
- Fernández, J.A. (1985). “Dynamical capture and physical decay of short-period comets”, *Icarus* 64, 308-319.
- Fernández, J.A., Ip, W.-H. (1987). “Time-dependent injection of Oort cloud comets into Earth-crossing orbits”, *Icarus* 71, 46-56.
- Fernández, J.A. (1988). “End states of short-period comets and their role in maintaining the zodiacal dust cloud”, *Earth, Moon and Planets* 41, 155-161.
- Ip, W.-H., Fernández, J.A. (1988). “Exchange of condensed matter among the outer and terrestrial protoplanets and their effect on surface impact and atmospheric accretion”, *Icarus* 74, 47-61.
- Rickman, H., Fernández, J.A., Gustafson, B.A.S. (1990). “Formation of stable dust mantles on short-period comet nuclei”, *Astron. Astrophys.* 237, 524-535.
- Ip, W.-H., Fernández, J.A. (1991). “Steady-state injection of short-period comets from the transneptunian cometary belt”, *Icarus* 92, 185-193.
- Tancredi, G.J., Fernández, J.A. (1991). “The angular momentum of the Pluto-Charon system: considerations about its origin”, *Icarus* 93, 298-315.
- Fernández, J.A., Gallardo, T. (1994). “The transfer of comets from parabolic orbits to short-period orbits: numerical studies”, *Astron. Astrophys.* 281, 911-922.
- Bolatto, A.D., Fernández, J.A., Carballo, G.F. (1995). “Asymmetric non-gravitational forces on long-period comets”, *Planet. Space Sci.* 43, 709-716.

Fernández, J.A., Ip, W.-H. (1996). “Orbital expansion and resonant trapping during the late accretion stages of the outer planets”, *Planet. Space Sci.* 44, 431-439.

Brunini, A., Fernández, J.A. (1996). “Perturbations of extended Kuiper disks by passing stars and giant molecular clouds”, *Astron. Astrophys.* 308, 988-994.

Ip, W.-H., Fernández, J.A. (1997). “On dynamical scattering of Kuiper belt objects in 2:3 resonance with Neptune into short-period comets”, *Astron. Astrophys.* 324, 778-784.

Fernández, J.A. (1997). “The formation of the Oort cloud and the primitive galactic environment”, *Icarus* 129, 106-119.

Fernández, J.A. (1998). “The transition from an individual science to a collective one: The case of astronomy”, *Scientometrics* 42, 61-74.

Brunini, A., Fernández, J.A. (1999). “Numerical simulations of the accretion of Uranus and Neptune”, *Planet. Space Sci.*, 47, 591-605.

Fernández, J.A., Tancredi, G., Rickman, H., Licandro, J. (1999). “The population, magnitudes, and sizes of Jupiter family comets”, *Astron. Astrophys.* 352, 327-340.

Tancredi, G., Fernández, J.A., Rickman, H., Licandro, J. (2000). “A catalog of observed nuclear magnitudes of Jupiter family comets”, *Astron. Astrophys. Suppl. Ser.* 146, 73-90.

Fernández, J.A., Brunini, A. (2000). “The buildup of a tightly bound comet cloud around an early Sun immersed in a dense galactic environment: Numerical experiments”, *Icarus* 145, 580-590.

Fernández, J.A., Gallardo, T., Brunini, A. (2002). “Are there many inactive Jupiter-family comets among the near-Earth asteroid population”, *Icarus* 159, 358-368.

Fernández, J.A. (2002). “Extrasolar planets: Theory and observations”, *Rev. Mex. Astron. Astrof.* 14, 3-6.

Fernández, J.A. (2002). “Long-period comets and the Oort cloud”, *Earth, Moon and Planets* 89, 325-343.

Fernández, J.A., Gallardo, T., Brunini, A. (2002). “Are there many inactive Jupiter Family Comets among the Near-Earth asteroid population?”, *Icarus* 159, 358-368.

Fernández, J.A., Gallardo, T., Brunini, A. (2003). “The scattered disk population and the Oort cloud”, *Earth, Moon and Planets* 92, 43-48.

Fernández, J.A., Gallardo, T., Brunini, A. (2004). “The scattered disk population as a source of Oort cloud comets: Evaluation of its current and past role in populating the Oort cloud”, *Icarus* 172, 372-381.

Gomes, R.S., Gallardo, T., Fernández, J.A., Brunini, A. (2005). “On the origin of the high-perihelion scattered disk: The role of the Kozai mechanism and mean motion resonances”, *Cel. Mech. Dyn. Astron.* 91, 109-129.

Tancredi, G., Fernández, J.A., Rickman, H., Licandro, J. (2006). “Nuclear magnitudes and the size distribution of Jupiter family comets”, *Icarus* 182, 527-549.

Fernández, J.A., Morbidelli, A. (2006). “The population of faint Jupiter family comets near the Earth”, *Icarus* 185, 211-222.

Fernández, J.A. (2008). “Origin of comet nuclei and dynamics”, *Space Science Reviews* 138, 27-42.

Sosa, A., Fernández, J.A. (2009). “Cometary masses derived from nongravitational forces”, *Mon. Not. R. Astron. Soc.* 393, 192-214.

Di Sisto, R., Fernández, J.A., Brunini, A. (2009). “On the population, physical decay and orbital distribution of Jupiter family comets. Numerical simulations”, *Icarus* 203, 140-154.

Fernández, J.A. (2011). “On the existence of a distant solar companion and its possible effects on the Oort cloud and the observed comet population”, *Astrophys. J.* 726, 33-39.

Sosa, A., Fernández, J.A. (2011). “Masses of long-period comets derived from non-gravitational effects - analysis of the computed results and the consistency and reliability of the non-gravitational parameters”, *Mon. Not. R. Astron. Soc.* 416, 767-782.

Fernández, J.A., Sosa, A. (2012). “Magnitude and size distribution of long-period comets in Earth-crossing or approaching orbits”, *Mon. Not. R. Astron. Soc.* 423, 1674-1690.

Sosa, A., Fernández, J.A., Pais, P. (2012). “On the asymmetric evolution of the perihelion distances of near-Earth Jupiter family comets around the discovery time”, *Astron. Astrophys.* 548, A64.

Fernández, J.A., Sosa, A., Gallardo, T., Gutiérrez, J.N. (2014). “Assessing the physical nature of near-Earth asteroids through their dynamical histories”, *Icarus* 238, 1-12.

Fernández, J.A., Sosa, A. (2015). “Jupiter family comets in near-Earth orbits: Are some of them interlopers from the asteroid belt?”, *Planet. Space Sci.* 118, 14-24.

Fernández, J.A., Gallardo, T., Young, J.D. (2016). “The end states of long-period comets and the origin of Halley-type comets”, *Mon. Not. R. Astron. Soc.* 461, 3075-3088.

Fernández, J.A., Licandro, J., Moreno, F., Sosa, A., Cabrera-Lavers, A., de León, J., Birthwhistle, P. (2017). “Physical and dynamical properties of the anomalous comet 249P/LINEAR”, *Icarus* 295, 34-45.

Fernández, J.A., Helal, M., Gallardo, T. (2018). “Dynamical evolution and end states of active and inactive Centaurs”, *Planet. Space Sci.*, 158, 6-15.

Fernández, J.A., Lemos, P., Gallardo, T., (2021). “On the origin of the Kreutz family of sungrazing comets”, *Mon. Not. R. Astron. Soc.* 508, 789-802

Publicaciones en Proceedings

Fernández, J.A. (1982). “A dynamical study of possible birthplaces of comets”, in: *Sun and Planetary System* (W. Fricke and G. Teleki, editors), Reidel, Dordrecht, Holland, pp. 371-374.

Fernández, J.A., Ip, W.-H. (1983). “Dynamical origin of the short-period comets”, in: *Asteroids, Comets, Meteors* (C.I. Lagerkvist and H. Rickman, eds.), Uppsala, Sweden, pp. 387-390.

Rickman, H., Fernández, J.A. (1986). “Formation and blowoff of a cometary dust mantle”, in: *The Comet Nucleus Sample Return Mission, Proc. Workshop, Canterbury, UK, ESA SP 249*, pp. 185-194.

Rickman, H., Gustafson, B.A.S., Fernández, J.A. (1990). “Model calculations of mantle formation on comet nuclei”, in *Asteroids, Comets, Meteors III*, Uppsala University, 423-426.

Fernández, J.A. (1990). “Collisions of comets with meteoroids”, in *Asteroids, Comets, Meteors III*, Uppsala University, 309-312.

Fernández, J.A., Rickman, H., Kamél, L. (1992). “The perihelion distribution and population size of short-period comets”, in *Periodic Comets* (Edited by J.A. Fernández and H. Rickman), Universidad de la República, 143-157.

Bolatto, A., Carballo, G., Fernández, J.A. (1992). “Outgassing perihelion asymmetry and dynamical evolution of comets”, in *Periodic Comets* (Edited by J.A. Fernández and H. Rickman), Universidad de la República, 25-33.

Gallardo, T., Fernández, J.A. (1992). “The dynamical path from the Oort cloud to periodic orbits: numerical studies”, in *Periodic Comets* (Edited by J.A. Fernández and H. Rickman), Universidad de la República, 35-43.

Fernández, J.A. (1994). “Dynamics of comets: Recent developments and new challenges”, in *Asteroids, Comets, Meteors 1993* (Edited by A. Milani, A. Cellino and M. Di Martino), Kluwer, 223-240.

Fernández, J.A. (2002) “Changes in the inclination-distribution of long-period comets with the orbital energy”, in *Proceedings of Asteroids, Comets, Meteors (ACM 2002)*, pp. 303-304, Technical University Berlin, ESA-SP-500.

Libros y capítulos de libros científicos

Fernández, J.A. (1985). “The formation and dynamical survival of the comet cloud”, in: *Dynamics of Comets: Their Origin and Evolution* (A. Carusi and G.B. Valsecchi, editors), Reidel, Dordrecht, Holland, pp. 45-70.

Fernández, J.A. (1992). “Comet showers”, in *Chaos, Resonance and Collective Dynamical Phenomena in the Solar System*, (Edited by S. Ferraz-Mello), Kluwer, 239-254.

Fernández, J.A., Ip, W.-H. (1991). “Statistical and evolutionary aspects of cometary orbits”, in *Comets in the Post-Halley Era*, Kluwer, 487-535.

Fernández, J.A., Ip, W.-H. (1997) “Accretion of the outer planets and its influence on the surface impact process of the terrestrial planets”, in *Astronomical and Biochemical Origins and the Search for Life in the Universe*, IAU Coll. 161, (C.B. Cosmovici, S. Bowyer, and D. Werthimer, eds.), pp. 235-244, Editrice Compositori, Bologna.

Fernández, J.A., Ip, W.-H. (1997). “Cometary dynamics”, in *Encyclopedia of Planetary Sciences* (Edited by J.H. Shirley and R.W. Fairbridge), pp. 119-124, Chapman & Hall.

Fernández, J.A., Brunini, A. (1998). "Origin and evolution of the Oort cloud", in Solar System Formation and Evolution, Astronomical Society of the Pacific Conference Series, Eds. D. Lazzaro et al., vol. 149, 107-116.

Fernández, J.A. (1999). "Cometary Dynamics", in Encyclopedia of the Solar System (P.R. Weissman, L.-A. McFadden and T. Johnson, eds.), pp. 537-556, Academic Press.

Fernández, J.A. (2005) "Comets: Nature, Dynamics, Origin and their Cosmogonical Relevance", Astrophysics and Space Science Library (ASSL), Springer, Germany.

Gomes, R.S., Fernández, J.A., Gallardo, T., Brunini, A. (2008). "The scattered disk: Origins, dynamics, and end states", in The Solar System Beyond Neptune (M.A. Barucci, H. Boehnhardt, D.P. Cruikshank, and A. Morbidelli, eds.), Univ. Arizona Press, Tucson, pp. 259-273.

Fernández, J.A. (2020). "Introduction: The Trans-Neptunian belt Past, present, and future", in The Trans-Neptunian Solar System (D. Prialnik, M.A. Barucci, and L.A. Young, eds.), Elsevier, Amsterdam, Netherlands, pp. 1-22.

Ensayos, libros didácticos y de divulgación

Cernuschi, F., Fernández, J.A., Vaio, O. (1978). "Manual de Prácticas Elementales de Astronomía", Depto. de Publicaciones, Universidad de la República, Uruguay.

da Silva Machado, L.E., Fernández, J.A. (1985). "Ao encontro de Halley", Editora Guanabara, Rio de Janeiro.

Fernández, J.A. (1986). "Naturaleza y origen de los cometas", XVII Cursos Internacionales de Verano, Universidad de la República, División Publicaciones y Ediciones, pp. 5-33.

Fernández, J.A. (editor) (1988). "Vida y Cosmos", Depto. Publicaciones, Facultad de Humanidades y Ciencias.

Fernández, J.A., Mizraji, E. (editores) (1995). "Vida y Cosmos - Nuevas reflexiones", EUDECI, Facultad de Ciencias.

Fernández, J.A. (2000). "Si existen, ¿Dónde están?. La continua fascinación del hombre por la vida extraterrestre", EUDECI/Fin de Siglo, Montevideo.

Fernández, J.A. (2021). "Plutón y otras anécdotas. Hitorias mínimas de la humanidad contadas a través de los nombres de los planetas menores", Penguin Random House, Montevideo.

Conferencias invitadas

- “Evolución dinámica de la nube de Oort”, V Colóquio Brasileiro de Dinámica Orbital, Curitiba, Brasil, 23-26 November, 1992.
- “Cometas: Origen y evolución dinámica”, I Ciclo de Cursos Especiales, Observatorio Nacional de Rio de Janeiro, Brasil. 25-29 November, 1996.
- “The formation and dynamical survival of the comet cloud”, International Astronomical Union Colloquium No. 83 “Dynamics of Comets Their Origin and Evolution”, Roma, Italy, 11-15 June, 1984.
- “Statistical and evolutionary aspects of cometary orbits”, International Astronomical Union Colloquium No. 121 “Comets in the Post-halley Era”, Bamberg, Germany, 24-28 April, 1989.
- “Comet showers”, International Astronomical Union Symposium No. 152 Chaos, Resonances and Collective Dynamical Phenomena in the Solar System, Angra dos Reis, Brazil, 15-19 July, 1991.
- “Dinámica de cometas”, VI Colóquio Brasileiro de Dinámica Orbital, Aguas de São Pedro, Brazil, 23-26 November, 1992.
- “Dynamics of comets: Recent developments and new challenges”, International Astronomical Union Symposium No. 160 “Asteroids, Comets, Meteors”, Belgirate, Italy, 14-18 June, 1993.
- “Origin of comets”, COSPAR Colloquium No. 10 “Asteroids, Comets, Meteors 96”, Versailles, Francia, 8-12 July, 1996.
- “Comets: Clues to the formation of the solar system and the early galactic environment”, IXth Rencontres de Blois Planetary Systems - The Long View, Chteu de Blois, France, 22-28 June, 1997.
- “The population, sizes and collision rates with the Earth of Jupiter family comets”, International Workshop Dynamics of Comets and Asteroids and their Roles in the Earth History, Shiga-Kyoto, Japan, 13-16 August, 1997.
- “Population and size distribution of comets in the terrestrial planets zone”, Joint Discussion 6 Interactions between Planets and Small Bodies, XXIIIrd International Astronomical Union General Assembly, Kyoto, Japan, 18-30 August, 1997.
- “From the Oort cloud to Halley-type comets”, International Astronomical Union Colloquium No. 173 Evolution and Source Regions of Asteroids and Comets, Tatransk Lomnica, Slovakia, 24-28 August, 1998.

- “Comets: Bodies holding valuable keys to the solar system origin”, Fifth Latin-American Conference on Space Geophysics, San Jos, Costa Rica, 3-7 November, 1998.
- “The accretion process of the outer planets and the heavy impact rate of the terrestrial planets”, Stromboli Workshop 1999 The Bridge between the Big Bang and Biology, Stromboli, Italy, 13-17 September, 1999.
- “Planet formation: how the discovered exoplanets fit and challenge the current theories”, Vulcano Workshop 2002 The Bridge between the Big Bang and Biology, Vulcano, Italy, 27 May - 1 June, 2002.
- “From the scattered to the Oort cloud. The extended scattered disk”, International Workshop Trans-Neptunian Objects. Dynamical and Physical Properties, Catania, Italy, 3-7 July, 2006.
- “Origin of comet nuclei and dynamics”, International Space Science Institute Workshop on Origin and Early Evolution of Comet Nuclei, Bern, Switzerland, 17-20 October, 2006.
- “New and evolved comets in the Earths neighborhood: Influx rates, perihelion distribution, and a re-evaluation of the mass of the dynamically active Oort cloud”, Dynamics and Formation of the Oort Cloud, Lille, France, 27-30 September, 2011.
- “The influx rate of long-period comets in the Earths neighborhood and their debris contribution to the interplanetary medium”, Joint Discussion 5 From Meteors and meteorites to their Parent Bodies: Current Status and Future Developments, IAU XXVIII General Assembly, Beijing, China, 20-31 August, 2012.
- “Where is the Oort cloud located?”, 44th Annual Meeting of the Division on Dynamical Astronomy of the American Astronomical Society, Paraty, Rio de Janeiro, Brazil, 5-9 May, 2013.
- “Félix Cernuschi: Los comienzos de la física profesional en el Uruguay”, XVI Reunión de la Sociedad Uruguaya de Física, Conchillas, Colonia, 6-7 September 2018.
- “The transneptunian belt - Past, present and future”, 50th Annual Meeting of the Division of Planetary Sciences, Knoxville, Tennessee, USA, 21-26 October 2018.