

# CURRICULUM VITAE – *Dr. Sophia Natalia Cisneros*

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## PERSONAL INFORMATION:

Physicist &  
Assistant Teaching Professor  
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## MOTIVATION

My research interest is centered on new applications of techniques of Special and General Relativity, as suggested by trends in data. In example, a fitting model for the flat-rotation curve problem in spiral galaxies, where galaxy gravitational manifolds are related by Lorentz type transformations. In this case, the symmetry is summarized in the work of Persic, Salucci, Rubin and McGaugh (CITE). Flat-rotation curves are primary evidence for dark matter.

My teaching and mentoring centers around the idea of community and love. I am one of the first of six Native Indigenous women with PhDs in physics in the United States. We are part of a national community of Native scholars in astrophysics and strive to find ways and Native American epistemologies that can ameliorate harm done by the Federal Indian Boarding school policy. In the process, we support a diverse legacy of people and thought in science.

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## CURRENT

2022 - present      **Assistant Teaching Professor** Astronomy, University of Washington

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EDUCATION & TRAINING

2011-14	<b>Postdoctoral Fellow Physics</b>	Massachusetts Institute Of Technology (MIT)
2011	<b>PhD Physics</b>	New Mexico State University (NMSU)
2006	<b>MSc Physics</b>	City College of New York (CCNY)

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RESEARCH

2021-present	Baby big bangs and modified cosmology
2011-21	The Luminous Convolution Model for flat-rotation curves in spiral galaxies
2007-11	Doppler Shifts in Quasi-Newtonian Interior Kerr Metrics
2006-7	Edge-on spiral Galaxy Rotation Curve Observations NGC 891 and M33
2002-6	BEC black holes

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TEACHING

2021-2022	A first course in special and general theories of relativity <i>University of Denver</i>
2016-2022	21st Century Physics and Astronomy - non-majors science sequence <i>University of Denver</i>
2016-2022	University Physics - calculus based introductory physics <i>University of Denver</i>
2016	Black Holes - introduction to special and general relativity, Honors College, <i>UMass Boston</i>
2014-6	Astronomy I and II, large enrollment non-majors year long science sequence, <i>UMass Boston</i>
2015	Electricity and Magnetism , Calculus based, <i>Boston University</i>
2013	Introduction to Physics, Calculus based, <i>MIT</i>
2011	Classical Mechanics, Algebra based, <i>CCNY</i>
2009-11	Classical Mechanics, Calculus based, <i>NMSU</i>
2008-9	Electricity and Magnetism, Calculus based, <i>NMSU</i>

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PROFESSIONAL DEVELOPMENT

Summer 2021      Hybrid Course Design Institute *Office of Teaching and Learning* University of Denver  
Fall 2019          Student-Faculty Partnership Program *Office of Teaching and Learning* University of Denver  
Summer 2017      New Faculty Workshop *American Association of Physics Teachers* American Center for Physics

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MENTORING, OUTREACH & SERVICE

2016 to present **Graduate Student Mentoring** bike club, outreach opportunities.  
developing skills as teachers to develop curricular activities. (University of Denver)

2013 to 2021      **IndigiLogix (MCE)** Indigenous Math-Culture-Science, science discovery in the place-based math and culture-technology context. University of Denver  
With respect to the survivors of the federal boarding school system <https://www.npr.org/sections/codeswitch/2021/08/28/1031398120/native-boarding-schools-repatriation-remains-carlisle>, Students k-12. University student mentors. Partners include: American Indian Academy of Denver, JeffCo, Adams, Denver, Boulder and Aurora Indian Education Programs.  
Scholarly article [1]

2011 to 2017      **Native Education Science Initiative (NESI)** to increase Indigenous American representation in summer sciences research experiences partners; MIT, NAICOB (North American Indian Center of Boston), HUNAP (Harvard University Native American Program)

2011-2014          **MIT AISES** restarted American Indian Science and Engineering Society on Campus  
Mentored; weekly coffees/hangouts, and group trips to surrounding Native community events.

## SEMINARS, COLLOQUIA AND CONFERENCE PRESENTATIONS

<b>Date</b>	<b>Title</b>	<b>Location</b>	<b>Type</b>
2021	Clock Effects	Case Western University <i>Cleveland, OH</i>	Colloquium
	Rainbow of Dark Sectors — Indigenous Mentoring	Aspen Center for Physics <i>Aspen, CO</i>	Speaker
2020	Native Women in Physics	SACNAS <i>Los Angeles, CA</i>	Speaker
	IndigiLogix Water Math Pedagogy	Northern California Indige- nous Water Conference <i>Arcata, CA</i>	Speaker
2016	A zero-parameter model for flat-rotation curves	University of Denver <i>Denver, CO</i>	Colloquium
2015	Frame-dependent dark matter	University of South Dakota <i>Vermillion, SD</i>	Colloquium
	Dark Matter in the metric	Humboldt State University <i>Arcata, CA</i>	Colloquium

SOCIETIES & COMMITTEES

- American Indian Science and Engineering Society (AISES) member
- Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) member
- American Astronomical Society (AAS) member.
- American Physics Society (APS) member.
- American Indian Graduate Center(AIGC) Alum.
- Space-Grant (NASA) Alum.

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FELLOWSHIPS, AWARDS & GRANTS:

2019–2020	<b>Excellence in Teaching Award</b> University of Denver
2011–2014	<b>Dr. Martin Luther King Jr. Postdoctoral Fellowship</b> MIT
2008–2011	<b>NASA Space Grant</b> NMSU
2009–2010	<b>Excellence in Teaching Award</b> NMSU
2007–2008	<b>Colloquia Grant</b> American Indian Graduate Center Fellow

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PAPERS:

**S. Cisneros**; J. 'Brien, N. Oblath, J. Formaggio, M. Crowley, K. Mikulski. 2016; Toward a Zero-Parameter Model for Galaxy Rotation Curve Data, (<https://arxiv.org/abs/1608.08316>).

**S. Cisneros**; Oblath, N.; Formaggio, J.; O'Brien, J.; 2015; The Luminous Convolution Model for spiral galaxy rotation curves, (<http://arxiv.org/abs/1506.04587>).

**S. Cisneros**; G. Goedecke; C. Beetle; M. Engelhardt; On the Doppler effect for light from orbiting sources in Kerr-type metrics; [arxiv.org/abs/1203.2502v2](https://arxiv.org/abs/1203.2502v2), Monthly Notices of the Royal Astronomical Society 2015 448 (3): 2733-2736 doi: 10.1093/mnras/stv172 .

**S. Cisneros**; Oblath, N.; Formaggio, J.; Ott, R.A.; Chester, D.; Ashley, A.; Rodriguez, A.; Battaglia, D.; & Robinson, R.; 2014; The LCM as an alternative to dark matter, [arxiv.org/abs/1407.7583](https://arxiv.org/abs/1407.7583) .

**S. Cisneros**; Oblath, N.; Formaggio, J.; Chester, D.; Ott, R., Ashely, A.; & Rodriguez, A., 2013; The Luminous Convolution Model, [arxiv.org/abs/arXiv:1309.7370](https://arxiv.org/abs/1309.7370).

#### CONFERENCE PROCEEDINGS:

1. **Cisneros, S.**, *American Physical Society, April Meeting 2013*, “The Light Side of Dark Matter”, Denver, CO, April 13 - April 16, 2013
2. **Cisneros, S.**, *Canada-America-Mexico Graduate Student Physics Conference*, “Cross terms in the metric”, Acapulco, MEX, October 22-24, 2009
3. **Walterbos, R. A. M. , Choi, J. , Cisneros, S., Patterson, M. , Wu, C.** “Multi-long-slit Spectroscopy For Kinematic Studies. I. Implementation And Demonstration”, 12.2007
4. **Jiehae Choi, S. Cisneros, C. Wu, M. Patterson, R. Walterbos** “Multi-long-slit Spectroscopy For Kinematic Studies. II. Initial Results For The Edge-on Galaxies NGC891 And NGC4244”, 12.2007

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## References

- [1] Michelle Garcia-Olp, Christine Nelson, and LeRoy Saiz. “Conceptualizing a Mathematics Curriculum: Indigenous Knowledge has Always Been Mathematics Education”. In: *Educational Studies* 55 (Oct. 2019), pp. 1–18. DOI: 10.1080/00131946.2019.1680374.