### CURRICULUM VITAE

# (A)

Name

Quo-Shin Chi

#### Address

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# Degrees

B. S. 1973-77 National Central University, TaiwanM. S. 1977-79 National Taiwan University, TaiwanPh. D. 1982-86 Stanford University

Area of Research

Differential Geometry

#### **Professional Experience**

1986-1992 Assistant Professor, Washington University 1993-1999 Associate Professor, Washington University 1999- Full Professor, Washington University

#### Honors and Awards

1977- Phi-Tau-Phi Scholastic Honor Society
1982-83 Stanford Graduate Fellowship
1989-91 NSF Grant
Fall 1993 MSRI Research Fellowship
1993-95 NSF Grant
2001-2004 NSF Grant
2002 and 2005 Who's Who Among America's Teachers
2006-2009 NSF Grant
2009-2011 NSF Travel Grant
2013 Invited speaker at the International Congress of Chinese Mathematicians (ICCM)
2016 Scholar in residence, Beijing Normal University, China
2017 ICCM best paper award
2018 Invited annual meeting speaker at International Consortium of Chinese Mathematicians (ICCM)

#### Invitations

July 1986, Invited colloquium speaker at Sinica Academia, Taiwan July 1986, Invited colloquium speaker at National Central University, Taiwan

- Oct. 1987, Co-organizer and special session speaker at AMS Nebraska meeting
- April 1989, Seminar speaker at University of Pennsylvania
- Nov. 1990, Colloquium speaker at University of Kansas, Lawrence
- April 1991, Invited one-hour speaker at Workshop on Differential Geometry and Mathematical Physics, Arkansas State University
- June 1993, Colloquium and seminar speaker at University of Georgia, Athens
- Fall 1993, Research Professor at MSRI
- Dec. 1993, Invited Colloquium speaker at National Tsin-Hua University, Taiwan
- Dec. 1993, Invited colloquium speaker at National Central University, Taiwan
- Feb. 1994, Invited one-hour speaker at Conference on Differential Geometry and Hamiltonian Systems, University of the West Indies, Kingston, Jamaica
- Oct. 1995, Invited special session speaker at AMS Boston meeting
- Mar. 1996, Invited special session speaker at AMS Iowa meeting
- Oct. 1997, Invited special session speaker at AMS Milwaukee meeting
- July 1998, Invited seminar speaker at University of Köln, Germany
- July 1998, Invited one-hour speaker at Workshop on Geometry and Analysis at University of Augsburg, Germany
- Aug. 1999, Plenary speaker at 4th International Conference on Geometry and Its Applications, Varna, Bulgaria
- May 2001, Invited colloquium speaker at University of Oklahoma, Norman
- July 2001, Invited seminar speaker at the National Center for Theoretical Sciences, National Tsin-Hua University, Taiwan
- July, 2001, Invited seminar speaker at Academic Sinica, Taiwan
- Oct. 2002, Invited special session speaker at the AMS Boston meeting
- Nov. 2002, Invited one-hour speaker at Differential Geometry Day, Eastern Illinois University.
- April 2003, Invited special session speaker at the AMS Bloomington meeting
- June 2005, Invited colloquium speaker at National Central University, Taiwan.
- Dec 2005, Invited seminar speaker at the National Center for Theoretical Sciences, National Tsing-Hua University, Taiwan.
- Dec. 2007, Invited colloquium speaker at National Tsing Hua University, Taiwan
- Jan. 2008, Invited colloquium speaker at National Taiwan University, Taiwan

- Jan. 2008, Invited colloquium speaker at National Central University, Taiwan
- Feb. 2009, Seminar speaker at National Taiwan University, Taiwan
- Mar. 2009, Invited two-hour lecture speaker at National Cheng Kung University, Taiwan
- Mar. 2009, Colloquium speaker at National Central University, Taiwan
- Mar. 2009, Invited four-hour concentrated lecture speaker at Advanced Mathematics Institute, Osaka City University, Japan
- Apl. 2009, Invited two-hour speaker at Fusion of Integrable Systems and Geometry, Mathematics Institute, Tôhoku University, Japan
- May 2009, Colloquium speaker at National Taiwan University, Taiwan
- Aug. 2010, Invited two-hour speaker at Workshop on Hypersurface Geometry and Integrable Systems, Mathematics Institute, Tôhoku University, Japan
- Nov. 2010, Invited forty-minute special session speaker at AMS Sectional Meeting at University of Notre Dame
- Dec. 2010, Invited lecturer at Beijing Normal University
- Mar. 2011, Invited seminar speaker at Rutgers University, New Brunswick
- May 2011, Invited visitor and colloquium speaker at Ehwa Womans University, Seuol
- May 2011, Invited lecturer at the School of Mathematics, Korea Institute for Advanced Study (KIAS), Seuol
- June-July 2012, Invited Summer Mini-Course lecturer, National Center for Theoretical Sciences, National Taiwan University, Taiwan
- July 2013, Invited speaker for the International Congress of Chinese Mathematicians, Taipei, Taiwan
- Oct. 2013, Invited speaker for the Midwest Geometry Conference, Stillwater, Oklahoma
- Oct. 2014, Geometry and Several Complex Variables Seminar speaker, Rutgers, New Brunswick
- June, 2015, Forum speaker, Minjiang University, Fuzhou, China
- June 2015, Invited speaker at 2015 International Conference on Finsler Geometry and Related Topics, Minjiang and Fuzhou Normal Universities, Fuzhou, China
- Sept.-Nov. 2016, Scholar in Residence, Beijing Normal University, Beijing, China
- Sept. 2016, Plenary speaker at the Second China-Japan Geometry Conference, Fujian Normal University, Fuzhou, China
- Nov. 2016, Lecturer on the classification of isoparametric hypersurfaces,

Tsinghua University, Beijing, China

- Nov. 2016, Colloquium speaker, Peking University, Beijing, China
- Dec. 2017, ICCM Best Paper Award recipient, Sun Yat Sen University, Guangzhou, China
- Dec. 2018, Invited speaker at ICCM meeting, Taipei, Taiwan
- April 2019, Geometry seminar speaker at UC Irvine
- June 2019, Member of the Scientific Committee and speaker at Workshop on the Isoparametric Theory, Beijing, China
- May 2022, Invited Lecture speaker, EAG (Emsemble of Algebra and Geometry) Seminar, co-organized by IBS Center for Complex Geometry, Ewha Womans University, and Gyeongsang National University, South Korea
- Oct. 2022, Invited speaker at Symmetry and Shape 2022, University of Santiago de Compostela, Spain

# **(B)**

## Publications

- A curvature characterization of certain locally rank-one symmetric spaces, J. Differ. Geom. 28(1988), 187-202.
- [2] Rigidity of Pseudo-holomorphic curves of constant curvature in Grassmann manifolds, Trans. A. M. S. 313(1989), 393-406, joint work with Yunbo Zheng.
- [4] Twistor theory and Blaschke manifolds, Ann. Global Anal. Geom. 9(1991), 197-204.
- [5] Quaternionic Kaehler manifolds and a curvature characterization of two-point homogeneous spaces, Ill. J. Math. 35(1991), 408-418.
- [6] Curvature characterization and classification of rank-one symmetric spaces, Pacific J. Math. 150(1991), 31-42.
- [7] Besicovitch Covering Lemma, Hadamard manifolds, and zero entropy, J. Geometric Analysis 1(1991), 373-382.
- [8] Rigidity of superminimal surfaces in complex projective spaces, Tôhoku Math. J. 44(1992), 83-101, joint work with Xiaokang Mo.
- [9] Isoparametric functions and flat minimal tori in CP<sup>2</sup>, Proc. A. M. S. 123(1995), 2849-2854, joint work with Gary Jensen and Ruijia Liao.
- [10] The moduli space of branched superminimal surfaces of a fixed degree, genus and conformal structure in the four-sphere, Osaka J. math.

**33**(1996), 669-696, joint work with Xiaokang Mo.

- [11] On the existence of infinite series of exotic holonomies, Inven. Math. 126(1996), 391-411, joint work with S. Merkulov and L. Schwachhoefer.
- [12] Exotic holonomies  $E_7^{(a)}$ , International J. Math., **8**(1997), 583-594, joint work with S. Merkulov and L. Schwachhoefer.
- [13] Exotic holonomy on moduli spaces of rational curves, Differ. Geom. Appls. 8(1998), 105-134, joint work with L. Schwachhoefer.
- [14] Symplectic connections and exotic holonomy, International J. Math. 9(1998), 47-61.
- [15] Degenerate  $G_3$ -connections, International J. Math. 9(1998), 945-955.
- [16] Normalized potentials of minimal surfaces in spheres, Nagoya Math. J. 156(1999), 187-214, joint work with Luis Fernandez and Hongyou Wu.
- [17] The dimension of the moduli space of superminimal surfaces of a fixed degree and conformal structure in the 4-sphere, Tôhoku Math. J.
   52(2000),299-308.
- [18] Degenerate torsion-free  $G_3$ -connections revisited, Int. J. Differ. Equ. Appl. 4(2002), 89-109.
- [19] Torsion-free  $G_3$ -connections that are not analytic, Differ. Geom. Appls. **21**(2004), 253-281.
- [20] Strong analytic controllability for hydrogen control systems, Proceedings of the 43rd IEEE Conference on Decision and Control (CDC 2004), 4812-4817, joint work with Chunhua Lan, Tzyh-Jong Tarn and John Clark.
- [21] Analytic controllability of time-dependent quantum control sstems, J. Math. Phys. 46, 052102, 1-21(2005), joint work with Chunhua Lan, Tzyh-Jong Tarn and John Clark.
- [22] Isoparametric hypersurfaces with four principal curvatures, Ann. Math., 166(2007), 1-76, joint work with Tom Cecil and Gary Jensen.
- [23] Dupin hypersurfaces with four principal curvatures, II, Geom. Dedicata 128(2007), 55-95, joint work with Tom Cecil and Gary Jensen.
- [24] Classification of Dupin hypersurfaces, in F. Dillen and I. Van de Woestyne, eds., Pure and Appied Differential Geometry, PADGE 2007, Shaker Verlag, Aachen, 2007, 48-56, joint work with Tom Cecil and Gary Jensen,
- [25] Effects of dominance on the probability of fixation of a mutant allele,J. Math. Biology 56(2008),413-434, joint work with Christina Chen and Stanley Sawyer.
- [26] On Kuiper's question whether taut submanifolds are algebraic, Pacific J. Math. 234(2008), 229-247, joint work with Tom Cecil and

Gary Jensen.

- [27] Isoparametric hypersurfaces with four principal curvatures revisited, Nagoya Math. J. 193(2009), 129-154.
- [28] A note on the paper "Isoparametric hypersurfaces with four principal curvatures", Hongyou Wu Memorial Volume, Vol. 3, 1-2, 127-134, Pacific Journal of Applied Mathematics, 2011.
- [29] Taut submanifolds are algebraic, preprint.
- [30] Isoparametric hypersurfaces with four principal curvatures, II, Nagoya Math. J. 204(2011), 1-18.
- [31] A new look at Condition A, Osaka J. Math. 49(2012), 133-166.
- [32] Isoparametric hypersurfaces with four principal curvatures, III, J. Diff. Geom. 94 (2013), 469-504.
- [33] Ideal theory and classification of isoparametric hypersurfaces, Proceedings of the 2013 Midwest Geometry Conference, Contemporary Mathematics volume 646(2015), 81-104, A.M.S., arXiv: 1405.5958.
- [34] Classification of isoparametric hypersurfaces, Proceedings of the Sixth International Congress of Chinese Mathematicians, Advanced Lectures in Mathematics 36, 437-451, 2017.
- [35] Orthogonal multiplications of type  $[3, 4, p], p \leq 12$ , joint with Haiyang Wang, Beiträger zur Algebra und Geometrie/Contributions to Algebra and Geometry **59**(2018), 167-197.
- [36] Isoparametric hypersurfaces with four principal curvatures, IV, J. Diff. Geom. 115(2020), 225-301.
- [37] The isoparametric story, a heritage of Élie Cartan, to appear in Proceedings of the International Consortium of Chinese Mathematicians, 2018, 197-260, International Press, 2021.
- [38] Structure of minimal two-spheres of constant curvature in the complex hyperquadric, joint with Zhenxiao Xie and Yan Xu, to appear in Adv. Math. 391(2021).
- [39] Fano 3-folds and classification of constantly curved holomorphic two-spheres in the complex G(2, 5), joint with Zhenxiao Xie and Yan Xu, preprint.

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# **Referee for Journals**

Acta Mathematica, Advances in Mathematics, Annals of Mathematics, Asian Journal of Mathematics, Bulletin of the London Mathematical Society, Canadian Mathematical Bulletin, Commentarii Mathematici Helvetici, Communications in Analysis and Geometry, Geometry and Topology, Geometriae Dedicata, Indiana University Mathematics Journal, Journal für die reine und angewandte Mathematik, Journal of the Australian Mathematical Society, Journal of Differential Geometry, Journal of Functional Analysis, Journal of Geometric Analysis, Journal of the London Mathematical Society, Journal de Mathématiques Pures et Appliquées, Mathematische Annalen, Journal of the Mathematical Society of Japan, Nagoya Mathematics Journal, Osaka Journal of Mathematics, Proceedings of the American Mathematical Society, Proceedings of the London Mathematical Society, Publications Mathématiques de l'IHÉS, Rocky Mountain Journal of Mathematics, Tohoku Mathematical Journal, Transactions of the American Mathematical Society, Tansformation Groups, Tsukuba Journal of Mathematics

#### Referee for books

Springer Lecture Notes in Mathematics; Kobayashi Memorial Volume

#### (D)

# Undergraduate Honors Thesis Students Directed

Ziming Shi, postdoctoral researcher of mathematics at Rutgers University, New Brunswick; Jenny Yeon, Amazon Scholar; Zack Weinstein, Ph. D. student of Physics at UC Berkeley.

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## Ph. D. Students Directed

Luis Fernandez, full professor, CUNY at Bronx; Chun Hua Lan (codirected with T. J. Tarn of SSM), assistant professor, University of New Brunswick.

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#### **Post Doctors Sponsored**

Jaehyouk Lee, full professor, Ewha Womans University, Korea; Xiangdong Xie, full professor, BGSU;