# Mathematik als Reise-Vehikel

## Kantonsschule ZH-Hottingen

## 21. April 2021

**Markus Brodmann**
**Institut für Mathematik**
**Universität Zürich**
**Winterthurerstrasse 190**
**8057 Zürich**

**brodmann@math.uzh.ch**

# Curriculum Vitae: „Das Übliche"

**Personal:** * 19. June 1945 / Citizenship:**Ettingen** (BL) Switzerland / Married / Four children (* 1970, 1974, 1976, 1981)/ Five grand-children (* 2010, 2013, 2013, 2015, 2020) / Domicile: **Winterthur**.

**Education:** *Primary School* in *Ettingen* (BL) 1951-1956 / *Secondary School* in *Therwil* (BL) 1957-1960 / *Apprentice* in Mechanical Design at F. Sauter AG in *Basel*, 1961-1962 / *Mathematisch-Naturwissenschaftliches Gymnasium* in *Basel*, Matura Typus C, 1963-1966 / *Studies in Mathematics* with *Minors Physics* and *Astronomie* at the *University of Basel* / Diploma in Mathematics, 1966-1971 *PhD Thesis* in Commutative Algebra, under Direction of Professor *W. Habicht*, *University* of Basel, Dr. Phil. II, summa cum laude, 1971-1974.

**Positions:** *Personal Assistant* of Professor *A.M.Ostrowski* in *Basel*, 1968-1971 / *Assistant* at the Institute of Mathematics of the *University of Basel*, 1971 - 1974 / *Post Doctoral Assistant* at the *Ecole Polytechnique Fédérale de Lausanne*, Research Group of Professor *M. André*, 1974-1976 / *Post Doctoral Fellow (SNF)* at the Westfälische Wilhelms-Universität in *Münster/Germany*, Research Group of Professor *H.J. Nastold*, 1977-1978 / *Post Doctoral Fellow (SNF)* at *Brandeis University*, *Waltham Mass./USA*, Research Group of Professor *D. Eisenbud*, 1978-1979 / *Post Doctoral Fellow* at the **Westfälische Wilhelms-Universität** in *Münster*, Research Group of Professor *H.J. Nastold*, *Habilitation*, 1979-1980 / *Lecturer* at the *University of Basel*, 1980-1983 / *Research Associate* at the *Forschungsinstitut für Mathematik (FIM) ETH Zürich*, 1981 / *Oberassistent* at the *University of Zürich*, 1982-1992 / *Associate Professor* at the *University of Zürich*, 1992-2005 / *Full Professor* at the *University of Zürich*, 2005-2010.

**Research:** Commutative Algebra, Algebraic Geometry, Popularization and Visualization in Mathematics.

**Publications:** 2 Textbooks, 84 peer reviewed articles, (87 recorded items at Mathscienet).

**Directed Theses:** 10 PhD Theses (2 of them co-directed), 42 Diploma/Master Theses.

**Regular Teaching:** *For Mathematicians:* Algebra, Commutative Algebra, Homological Algebra, Algebraic Topolgy, Algebraic Geometry, Algebraic Functions, Algebras of Differential Operators, Local Cohomology and Related Topics, Algorithmic Methods in Algebra and Algebraic Geometry. *For Secondary Teachers:* Analysis, Geometry, Number Theorie. *For Life- and Earth Scientists:* Analysis, Stochastics.

**Invited Teaching:** 162 Research Related Talks, 19 Short Courses, 32 Talks for General Audience.

# Internationalität im Überblick:

**Vorträge, Tagungen, Forschungsaufenthalte (19 Länder): Schweiz:** Basel, Zürich, Bern, Lausanne, Genf, Winterthur / **Deutschland (& DDR):** Berlin, Münster, Bonn, Oberwolfach, Paderborn, Halle, Osnabrück, Göttingen, Bremen, Regensburg, Bochum, Eisenach, Vechta, Essen, Leipzig, Freising, Passau / **Frankreich:** Rennes, Strasbourg, Luminy / **Italien:** Torino, Genua, Siena, Trento, Ferrara / **Österreich:** Innsbruck / **Schweden:** Stockholm / **Niederlande:** Utrecht, Groningen, Amsterdam / **Slovakei:** Bratislava / **England & Schottland:** Sheffield, Durham, Cambridge, Edinburgh, Exeter / **USA:** Riverside Ca., Waltham Mass., Mount Holyoke NY, East Lansing Mich. / **Mexico:** Guanajuato / **Indien:** Bombay, Bangalore, Irinjalakuda / **Iran:** Teheran / **Pakistan:** Lahore / **Türkei:** Istanbul / **Vietnam:** Hanoi, Quy Nhon, Thai Nguyen, Hué, Saigon / **Japan:** Nagoya, Kyoto / **Südkorea:** Seoul, Daejeon, Pohan, Busan / **Uganda:** Kampala, Kabale.

**Ko-Autoren und Mitarbeiter (Total 27, aus 7 Ländern): Schweiz:** 10 / **Deutschland (& DDR):** 3 / **England:** 2 / **USA:** 3 / **Iran:** 3 / **Vietnam:** 4 / **Südkorea:** 2.
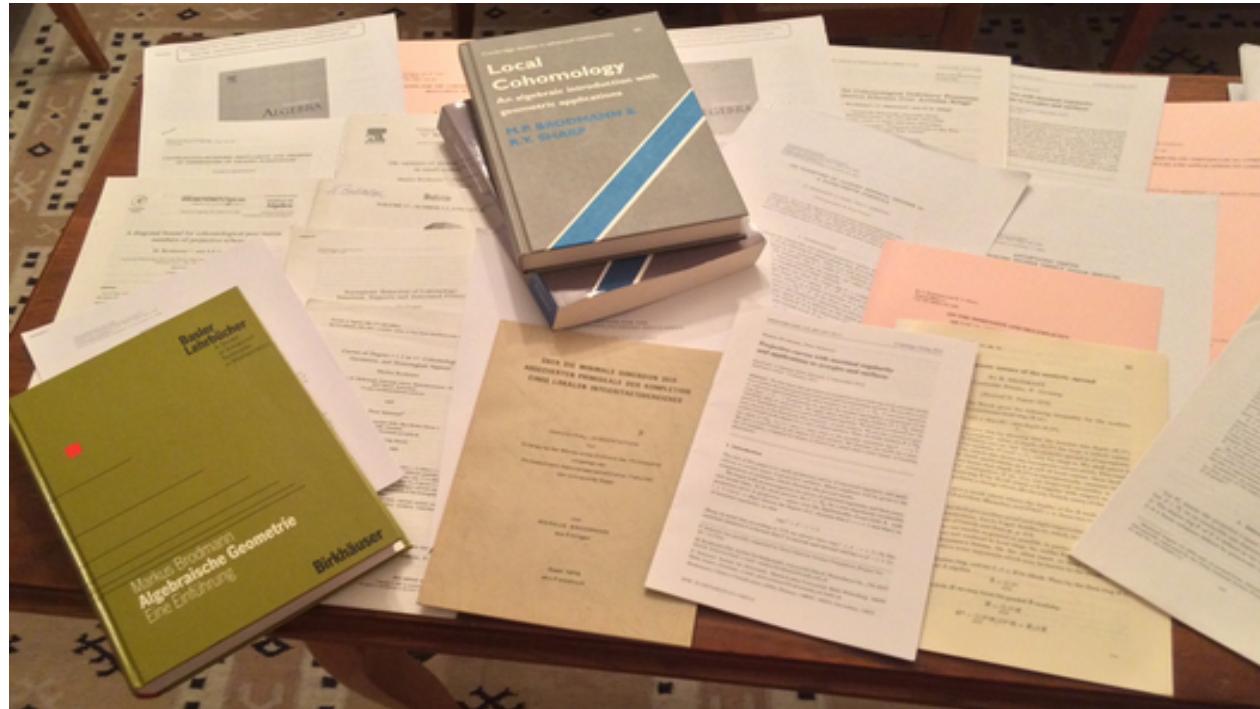
# Erster Sprung „über die Mauer"

**MNG Basel (1963-1966)**

**„Euler - Preis" 1963**

**Berlin, DDR (1965)**

**Schüler-"Austausch"**

# Universität Basel: Lokal und International

## (1966 - 1974)

**Haus „zur Hölle"**
**Mathematisches Institut**

**Alte Universität**
**\* 1460 (Konzil zu Basel)**

# Internationalität historisch und per Korrespondenz

## A. M. Ostrowski (1893-1986)

**(mein Chef in Basel 1968-1971)**

**Student von David Hilbert (1862-1943) in Göttingen**
**Kommilitone von Olga Tausski-Todd (1906-1995)**
**Kollege von A.S. Householder (1904-1993)**
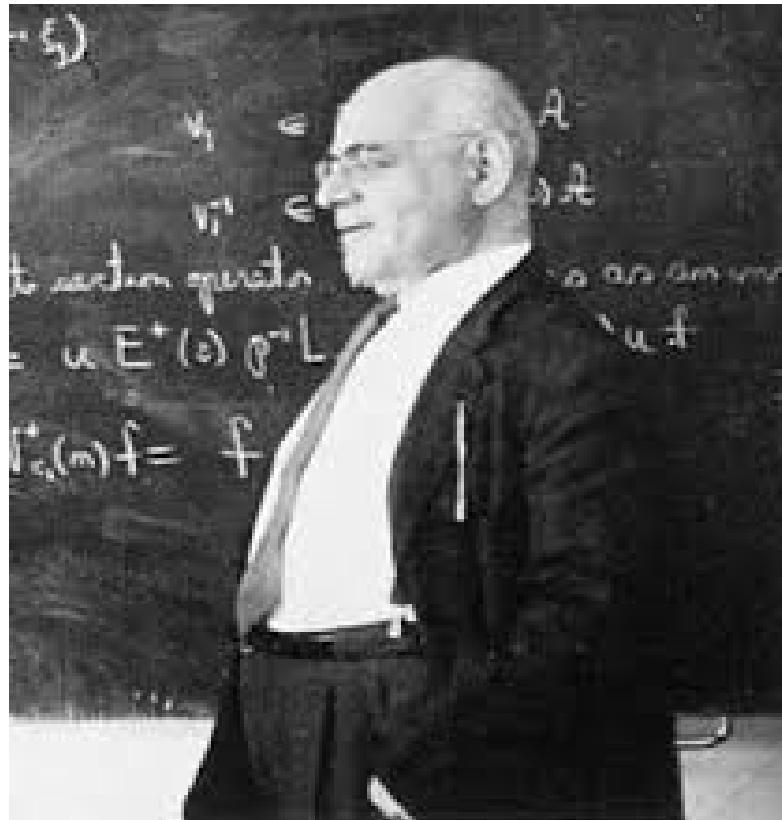
**David Hilbert**          **Olga Tausski (1932)**

# Erste Zwischen - Stationen

**EPFL (Lausanne) (1974-1977)**



**UCR (Riverside/California) (1975)**



**Brandeis University (Waltham/Mass.) (1978/79)**



**Universität Münster (Deutschland) (1977-1981)**

# Internationale Drehscheibe im Schwarzwald

## Mathematisches Forschungs-Institut Oberwolfach

**Wahrzeichen: Boy'sche Fläche
(= Modell der projektiven Ebene)**

# Via UNIBAS und ETH an die UZH

**FIM ETHZH / UNIBAS**

**(1980-1982)**

**IMATH-UZH (1982-2010)**

# International in Zürich – im Kleinen Rahmen

## Seminar Höhere Algebra 2008 (mit Aufblasung)
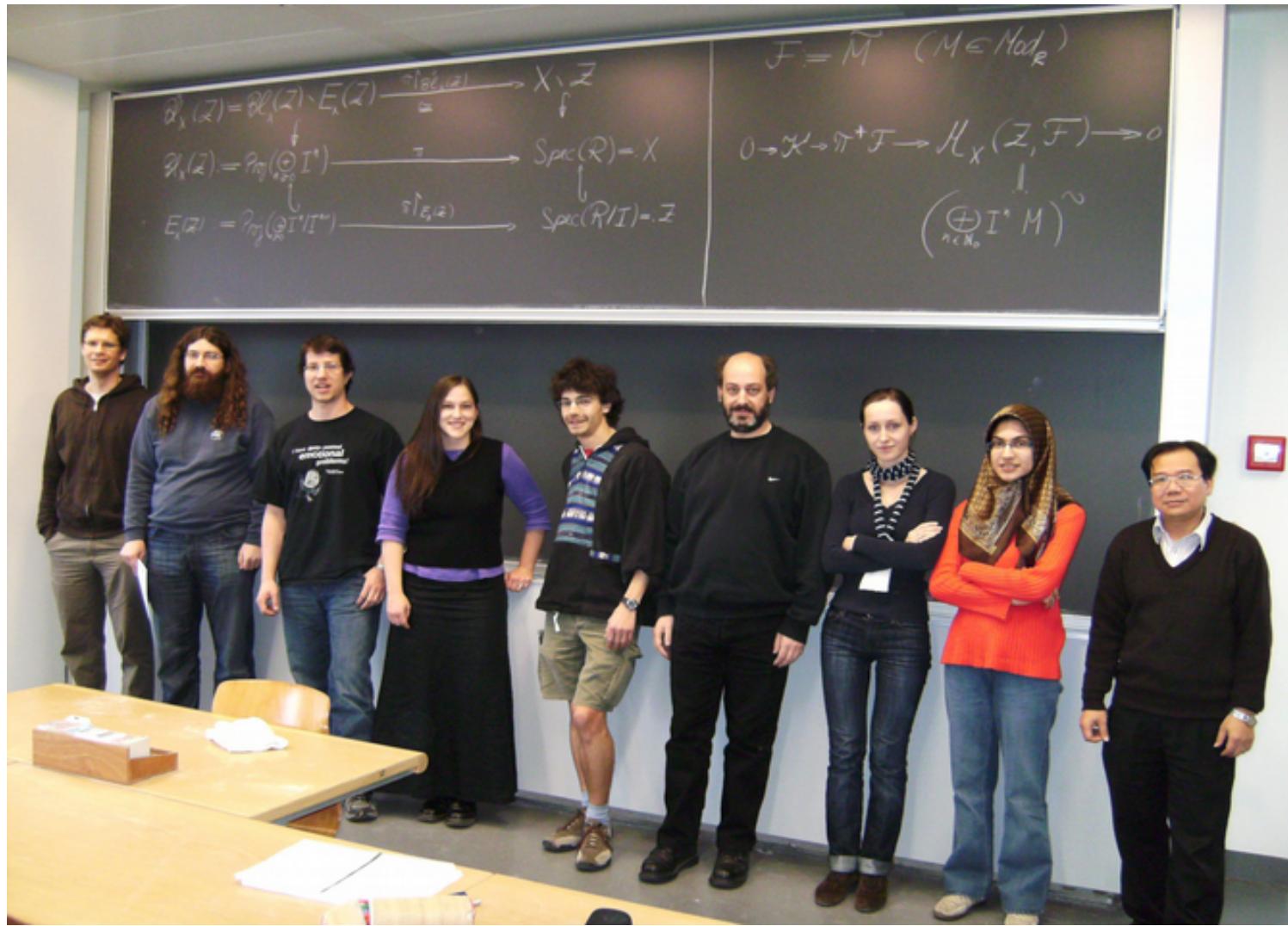
# Halle, Leipzig, Berlin
## 1965, 1979, 1990 … 2015

**Halle / Saale (Marktplatz, Roter Turm)**



**mit Peter Schenzel** (am MF Oberwolfach)



**Leipzig (Gewandhaus, MDR, Universität)**



**Berlin (Museuminsel mit Spree)**

# Halle, Leipzig, Berlin: Publikationen

M.Brodmann, W.Vogel: ***Bounds on the cohomology and the Castelnuovo regularity of certain surfaces,*** Nagoya Mathematical Journal 131, 109-126 (1993)

M.Brodmann, P.Schenzel: ***Curves of degree r+2 in P(r): Cohomological, geometric and homological aspects,*** Journal of Algebra 242, 577-623 (2001)

M.Brodmann, P.Schenzel: ***On projective curves of maximal regularity,*** Mathematische Zeitschrift 244, 271-289 (2003)

M.Brodmann, P.Schenzel: ***On varieties of almost minimal degree in small codimension,*** Journal of Algebra 305, 789-801 (2006)

M.Brodmann, P.Schenzel: ***Arithmetic properties of projective varieties of almost minimal degree,*** Journal of Algebraic Geometry 16, 347-400 (2007)

M.Brodmann, P.Schenzel: ***Projective curves with maximal regularity and applications to syzygies and surfaces,*** Manuscripta Mathematica 135 (2011) 469-495

M.Brodmann, E.Park, P.Schenzel: ***On varieties of almost minimal degree II: A rank-depth formula,*** Proceedings ot the AMS 139 (2011) 2025-2032

M.Brodmann, P.Schenzel: ***Projective surfaces of degree r+1 in projective r-space and almost non-singular projections,*** Journal of Pure and Applied Algebra 216 (2012) 2241-2255

M.Brodmann, W.Lee, E.Park, P.Schenzel: ***Projective varieties of maximal sectional regularity,*** Journal of Pure and Applied Algebra 221 (2017) 98-118

M.Brodmann, W.Lee, E.Park, P.Schenzel: ***On surfaces of maximal sectional regularity,*** Taiwanese Journal of Mathematics 21 (2017) 549 – 567

M.Brodmann, P.Schenzel: ***On families of blowups of the real affine plane: classification, isotopies and visualizationsurfaces of maximal sectional regularity,*** Journal of Symbolic Computation 104 (2021) 874 - 898

Zwei weitere Arbeiten in Vorbereitung

# Sheffield England

## University of Sheffield

## (1988 …. 2012)

**(Main Building of the University)**

**Rodney Y. Sharp** (am MF Oberwolfach)
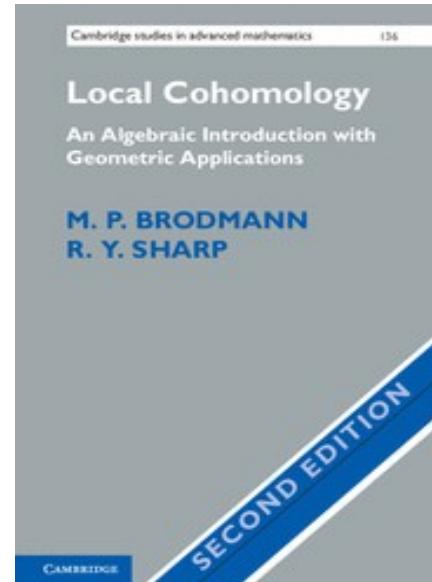
# Sheffield: Publikationen

M.Brodmann, R.Y.Sharp: *Local Cohomology-An Algebraic Introduction with Geometric Applications,* Cambridge Studies in Advanced Mathematics 60, Cambridge University Press (1998) 416 pages, 5 illustrations, ISBN 0 521 37286 0.

M.Brodmann, C.Rotthaus, R.Y.Sharp: *On annihilators and associated primes of local cohomology modules,* Journal of Pure and Applied Algebra 153, 197-227 (2000)

M.Brodmann, R.Y.Sharp: *On the dimension and the multiplicity of local cohomology modules,* Nagoya Mathematical Journal 167, 217-233 (2002)

M.Brodmann, M.Katzmann, R.Y.Sharp: *Associated primes of graded components of local cohomology modules,* Transactions of the AMS 354, Number 11, 4261-4283 (2002)

M.Brodmann, R.Y.Sharp: *Geometric domains with specified pseudo-dimensions,* Journal of Pure and Applied Algebra 182, 151-164 (2003)

M.Brodmann, R.Y.Sharp: *Supporting degrees of multi-graded local cohomology modules,* Journal of Algebra 321 (2009) 450-482

M.Brodmann, R.Y.Sharp: *Local Cohomology-An Algebraic Introduction with Geometric Applications,* Second Exdended, Updated and Revised Edition, Cambridge Studies in Advanced Mathematics 163 (2012) 505 pages, 330 exercises, ISBN 9780521513630.

# Vietnam ([1979] => 1997 …. 2017)

**Reisfeld am Mekong**

**Terrassen-Felder nördlich Thai Nguyen**

**Ha-Long Bay**

**Saigon (Ho Chi Minh City)**

# IM VAST / VIASM

**Institute of Mathematics VAST / Hanoi**

**Ngo Bao Chau (Fields-Medaille 2010)**





**Vietnam Institute for Advanced Study in Mathematics (VIASM) Hanoi**

# In der Provinz: Quy Nhon ... Thai Nguyen

**Quy Nhon University (1997, 1999)**

**Le The Nhan**

**Thai Nguyen University (2000 … 2014)**

**Tee-Ernte bei Thai Nguyen**

# Vietnam: Publikationen

M. Brodmann: ***Cohomology of certain projective surfaces with low sectional genus and low degree,*** in: D.Eisenbud (Ed) "Commutative Algebra, Algebraic Geometry and Computational Methods" International Conference Hanoi/Vietnam August 1996, 173-200, Springer (1999)

M.Brodmann, C.Matteotti, N.D.Minh: ***Bounds for cohomological Hilbert functions of projective schemes over artinian rings,*** Vietnam Journal of Mathematics 28:4, 345-384 (2000)

M.Brodmann: ***Lectures on local cohomology – Quy Nhon 1999,*** Institute of Mathematics, Hanoi (2001)

M.Brodmann, C.Matteotti, N.D.Minh: ***Bounds for cohomological deficiency functions of projective schemes over artinian rings,*** Vietnam Journal of Mathematics 31:1, 71-113 (2003)

M.Brodmann, LT.Nhan: ***A finiteness result for associated primes of certain Ext-modules,*** Communications in Algebra 36(04), 1527-1536 (2008)

M.Brodmann, M.Jahangiri, C.Linh: ***Castelnuovo-Mumford regularity of deficiency modules,*** Journal of Algebra 322 (2009) 12816-12838

M.Brodmann, M.Jahangiri, C.Linh; ***Boundedness of cohomology,*** Journal of Algebra 323 (2010) 458 - 472

M.Brodmann, C.H.Linh, M.H.Seiler: ***Castelnuovo-Mumford regularity of annihilators, Ext- and Tor- modules,*** in: Commutative Algebra: Expository Papers Dedicated to David Eisenbud on the Occasion of His 65th Birthday (I. Peeva, Ed.), pg. 207-236, Chapter 6; DOI 10.1007/978-1-4614-5292-8_6, Springer Science & Business Media New York Heidelberg Dordrecht London (2013)

M.Brodmann, L.T.Nhan: ***On canonical Cohen-Macaulay modules,*** Journal of Algebra 371 (2012) 480-491

M.Brodmann, C.H.Linh: ***Castelnuovo-Mumford regularity, postulation numbers and relation types,*** Journal of Algebra 419 (2014) 124-140

M.Brodmann: ***Notes on Weyl Algebras an D-Modules,*** in: Four Lecture Notes on Commutative Algebra (Ed.: Nguyen Tu Cuong, Le Tuan Hoa, Ngo Viet Trung); Lecture Notes Series of the Vietnam Institute for Advanced Study in Mathematics, Volume 4 (2015) 7-97

M.Brodmann: ***Notes on Weyl Algebras an D-Modules, [revised and extended version]*** in: Commutative Algebra and its Interaction to Algebraic Geometry, Lecture Notes in Mathematics, Vol 2210, (2018) 1 – 117, Springer Cham.

# Süd-Korea (2006 … 2020)

**Ausblick vom Daedunsan**

**Silla-Gräber Gyeongiu (7.& 8. Jh.)**
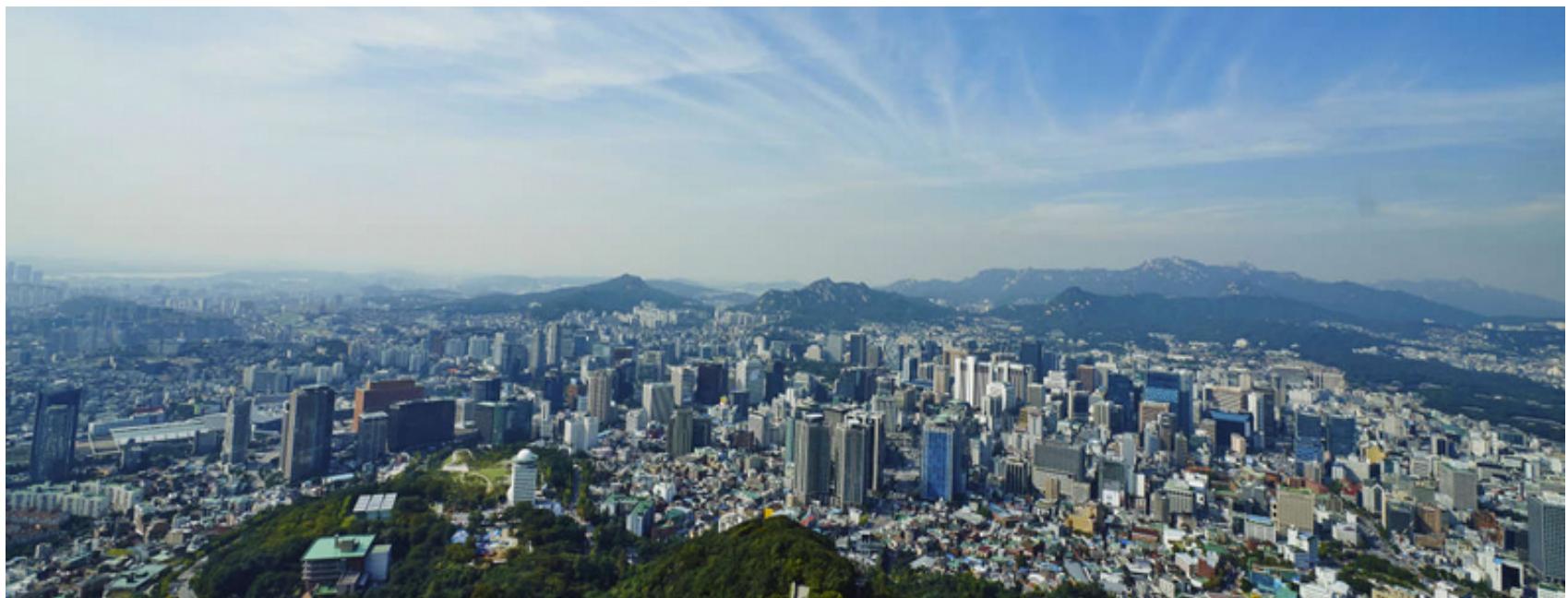




**Seoul**

# KU Seoul / PNU Busan

**Korea University Seoul**



**Euisung Park (mit Sohn Juitsu)**



**Pukyong National University Busan**



**Wanseok Lee**

# Südkorea: Publikationen (Überschneidung mit: Halle, Leipzig, Berlin)

M.Brodmann: *Blowing-Up!* KIAS Newsletters, Korea Institute for Advanced Study / March 1st, 2009 / pg. 40-43

M.Brodmann, E.Park: *On varieties of almost minimal degree I: secant loci of rational normal scrolls,* Journal of Pure and Applied Algebra 214 (2010) 2033-2043

M.Brodmann, E.Park, P.Schenzel: *On varieties of almost minimal degree II: A rank-depth formula,* Proceedings ot the AMS 139 (2011) 2025-2032

M.Brodmann, E.Park: *On varieties of almost minimal degree III: Tangent spaces and embedding scrolls,* Journal of Pure and Applied Algebra 215 (2011) 2859-2872

M.Brodmann, E.Park: *On linear projections of quadratic varieties,* Proceedings of the American Mathematical Society, Volume 144, Number 6, June 2016, 2307-2314

M.Brodmann, W.Lee, E.Park, P.Schenzel: *Projective varieties of maximal sectional regularity,* Journal of Pure and Applied Algebra 221 (2017) 98 – 118

M.Brodmann, W.Lee, E.Park, P.Schenzel: *On surfaces of maximal sectional regularity,* Taiwanese Journal of Mathematics 21 (2017) 549 – 567

Eine weitere Arbeit in Vorbereitung.

# Indien: Bombay, Bangalore, Irinjalakuda

**Tata Institute of Fundamental Research  &  Indian Institute of Technology, Bombay (2000 … 2016)**





**Indian Instiute of Science, Bangalore        &        St. Joseph's College, Irinjalakuda (2003 … 2016)**

# Uganda: Kabale (2012 - 2014)

**Bunyonyi-See**

**Berg-Gorillas**

**Kabale University (Dozenten-Jahresfeier)**

**St. Mary's College Rushoroza**

# Indien & Uganda: Publikationen, Skripte und Präsentationen (Überschneidung mit: Vietnam)

M.Brodmann: ***Strips, Tubes, Bottles, Caps, Umbrellas - a few Examples of Visualizations of Surfaces:*** Bulletin of the Bombay Mathematical Colloquium 17:1-2, January 2001, 1-26 (2002) 1 - 26

M.Brodmann: ***Asymptotic behaviour of cohomology: tameness, supports and associated primes;*** in: S. Ghorpade, H. Srinivasan, J. Verma (Eds.), "Commutative Algebra and Algebraic Geometry" Proceedings, Joint International Meeting of the AMS and the IMS on Commutative Algebra and Algebraic Geometry, Bangalore/India, December 17-20, 2003, Contemporary Mathematics Vol 390, 31-61 (2005) 31 - 61

M.Brodmann: ***Four Lectures on Local Cohomology:*** in: T.Trivikraman, K.V.Geetha, Sr.Lilly P.L.(Eds),"Proceedings of the International Workshop on Commutative Algebra and Algebraic Geometry", Irinjalakuda, Kerala/India, July 18-23, 2005;  (2006) 3 - 46

M.Brodmann: ***Bounding cohomology of coherent sheaves over projective schemes:*** Journal of Theoretical and Computational Mathematics; Vol. 2, No. 1, March 2016, 6-70

M.Brodmann: ***Lectures on Weyl Algebras and D-Modules;*** Notes prepared for a course, taught from 25.-28.June 2016 in the Framework of the "International Workshop on Local Cohomology" organized by the Indian Institute of Technology Bombay at St. Joseph's College Irinjalakuda, Kerala/India

M. Brodmann: ***Around the Circle;*** Notes based on a Course for Mathematics Teachers at High Schools in Kabale Region, held at St. Mary's College Rushoroza, Kabale, Uganda, 28. April - 2. May 2014

M.Brodmann: ***Blowing-Up and its Visualization;*** Presentation for a talk at the the Summer-School "Surface-Topology-in the Class Room and Beyond", Kabale University, Uganda, January 2013, organized in the framework of a North-South Cooperation between the University of Zürich and Kabale University; presented at St. Mary's College Rushoroza, Kabale/Uganda, 29. April 2014.

M. Brodmann: ***Strips, Tubes, Bottles, Caps, Umbrellas - a Few Examples of Visualzations of Surfaces;*** Presentation performed at the Summer School "Surface Topology-in the Class Room and Beyond" Kabale University, Uganda, January 2013, organized in the framework of a North-South Cooperation between the University of Zürich and Kabale University; presented also at St. Mary's College Rushoroza, Kabale/Uganda, 28. April 2014

M. Brodmann: ***Castelnuovo-Mumford Regularity - a Survey;*** Presentation for a talk at Makere University, Kampala, Uganda, at 23. January 2014 in the Framework of a North-South Cooperation between the University of Zürich and Uganda

M. Brodmann: ***Why to Become a Mathematician?*** Presentation used used for talks given at: the University of Thai Nguyen/Vietnam, 9. November 2013; the University of Hué, Hué/Vietnam, 6.December 2013; the Institute of Mathematics at the Vietnam Academy of Science and Technology (VAST), Hanoi/Vietnam, 18.December 2013; St. Mary's College Rushoroza, Kabale/Uganda, 1. May 2014; St. Joseph's College Irinjalakuda, Kerala/India, 28.June 2016; Sahrdaya College of Advanced Studies of Arts and Science, Kodakara, Thrissur. Kerala/India, 30.June 2016; Ho Chi Minh City University of Pedagogy, Ho Chi Minh City(Saigon)/Vietnem, 7.September 2017; Pedagogical University of Thai Nguyen, Thai Nguyen/Vietnam, 17. September 2017

M. Brodmann: ***The Grasp for Infinity;*** Presentation for a talk held at St. Joseph's College Irinjalakuda, Kerala/India, 22. Jume 2016

M. Brodmann: ***Truth and Provability;*** Presentation for a talk held at St. Joseph's College Irinjalakuda, Kerala/India, 24. June 2016