

Summer Mini-school on Algebraic Geometry

August 20-23, 2024

IBS POSTECH Campus Bldg.

Organizers

| Jihun Park (IBS Center for Geometry and Physics & POSTECH)

| Kyoung-Seog Lee (POSTECH)

Invited Speakers

| Sung Rak Choi (Yonsei University)

| Seung-Jo Jung (Jeonbuk National University)

| In-kyun Kim (Korea Institute for Advanced Study)

| Luca Rizzi (IBS Center for Geometry and Physics)

| Joonyeong Won (Ewha Womans University)

ibS Institute for
Basic Science

POSTECH
Department of Mathematics

Summer Mini-school on Algebraic Geometry

August 20-23, 2024

Pohang

Abstracts & Pre-arrival Guide

ibS Center for Geometry and Physics

Program

Time	August 20 (Tue)	August 21 (Wed)	August 22 (Thu)	August 23 (Fri)
10:00 – 12:00		Seung-Jo Jung	Seung-Jo Jung	Seung-Jo Jung
12:00 – 14:00		Lunch		
14:00 – 14:30	Seung-Jo Jung	Joonyeong Won	Luca Rizzi	In-Kyun Kim
14:30 – 15:00				
15:00 – 15:30				
15:30 – 16:00				
16:00 – 16:30	Break		Free Discussion	
16:30 – 17:30	Sung-Rak Choi			
17:30 – 20:00			Dinner	

Abstracts

Tuesday, August 20

Time	Speaker	Title & Abstract
14:00 – 16:00	Seung-Jo Jung (Jeonbuk National University)	An introductory course on mixed Hodge modules This course gives an introduction to Morihiko Saito's theory of mixed Hodge modules. One can think of mixed Hodge modules as a certain class of D-modules with Hodge structures. The main goal of this course is to understand how D-modules come into the theory and to explain two important theorems: the structure theorem and the direct image theorem. If time permits, we discuss recent applications of the theory in algebraic geometry. The course goes as follows: Lecture 1: D-modules and perverse sheaves Lecture 2: The classical Hodge theory and variations of Hodge structures Lecture 3: Hodge modules Lecture 4: Two important theorems
16:30 – 17:30	Sung-Rak Choi (Yonsei University)	On the resulting models of anti-MMP In this talk, we give some updates on a theory on a potential triples and anti-MMP. We study how to run the $(K_X + \Delta)$ -minimal model program by suggesting the flowchart for such a program. We will also discuss the possible outcomes of the program.

Abstracts

Wednesday, August 21

Time	Speaker	Title & Abstract
10:00 – 12:00	Seung-Jo Jung (Jeonbuk National University)	An introductory course on mixed Hodge modules This course gives an introduction to Morihiko Saito's theory of mixed Hodge modules. One can think of mixed Hodge modules as a certain class of D-modules with Hodge structures. The main goal of this course is to understand how D-modules come into the theory and to explain two important theorems: the structure theorem and the direct image theorem. If time permits, we discuss recent applications of the theory in algebraic geometry. The course goes as follows: Lecture 1: D-modules and perverse sheaves Lecture 2: The classical Hodge theory and variations of Hodge structures Lecture 3: Hodge modules Lecture 4: Two important theorems
14:00 – 15:00	Joonyeong Won (Ewha Womans University)	K-stability of weighted del pezzo hypersurfaces For an importance of the existence problem of Sasaki-Einstein metrics on 5-dimensional manifolds, Kollar started to consider the existence problem of the Kaehler-Einstein metric of weighted del Pezzo hypersurfaces that was verified in low index cases. We discuss recent development of that problem.

Abstracts

Thursday, August 22

Time	Speaker	Title & Abstract
10:00 – 12:00	Seung-Jo Jung (Jeonbuk National University)	An introductory course on mixed Hodge modules This course gives an introduction to Morihiko Saito's theory of mixed Hodge modules. One can think of mixed Hodge modules as a certain class of D-modules with Hodge structures. The main goal of this course is to understand how D-modules come into the theory and to explain two important theorems: the structure theorem and the direct image theorem. If time permits, we discuss recent applications of the theory in algebraic geometry. The course goes as follows: Lecture 1: D-modules and perverse sheaves Lecture 2: The classical Hodge theory and variations of Hodge structures Lecture 3: Hodge modules Lecture 4: Two important theorems
14:30 – 15:30	Luca Rizzi (IBS Center for Geometry and Physics)	Relative Castelnuovo-de Franchis Theorem and monodromy of local systems associated to a VHS Consider a semistable fibration between non-singular complex projective varieties. The relative holomorphic differential forms which are locally liftable to closed holomorphic forms naturally define local systems contained in the kernel of the variation of Hodge structure on the smooth part of the fibration. In this setting, we present a relative version of a theorem by Castelnuovo and de Franchis and use it to show the existence, up to base change, of higher irrational pencils and the finiteness of the monodromy representations associated to these local systems. We interpret these results in light of the so called second Fujita decomposition of the direct image of the relative dualizing sheaf and of the semiampleness of this vector bundle.

Abstracts

Friday, August 23

Time	Speaker	Title & Abstract
10:00 – 12:00	Seung-Jo Jung (Jeonbuk National University)	An introductory course on mixed Hodge modules This course gives an introduction to Morihiko Saito's theory of mixed Hodge modules. One can think of mixed Hodge modules as a certain class of D-modules with Hodge structures. The main goal of this course is to understand how D-modules come into the theory and to explain two important theorems: the structure theorem and the direct image theorem. If time permits, we discuss recent applications of the theory in algebraic geometry. The course goes as follows: Lecture 1: D-modules and perverse sheaves Lecture 2: The classical Hodge theory and variations of Hodge structures Lecture 3: Hodge modules Lecture 4: Two important theorems
14:00 – 15:00	In-Kyun Kim (Korea Institute for Advanced Study)	Spectrum of non-degenerate functions The spectrum of an isolated singularity is a set of rational numbers, which is its most important discrete invariant. It describes the relationship between the semisimple part of the monodromy and the Hodge filtration of the mixed Hodge structure. In this talk, we discuss Steenbrink's formula for the spectrum of convenient Newton non-degenerate functions, and prove the symmetry of combinatorial polynomials in the simplicial case.

Lined area for writing, consisting of multiple horizontal lines.

Workshop GENERAL INFORMATION

- Meals During the Workshop

Lunch

Lunchbox is provided to conference registrants from August 21st to 23rd.

Venue: Room #302, 303

Time: 12:00-14:00 pm

Please take and return the lunchbox at the same place.

Dinner on August 22 for all participants

PLEASE SIGN UP for the dinner at the reception.

Restaurant & Menu: TBA

Time: 17:30 ~ 19:30 pm

- **Wireless Internet Access**

Free wireless internet is available in IBS building.

- Network Name: Guest_ibsWiFi
- ID: ibscgp11
- Password: !ibscgp11

- **Banking**

Banking (Global ATM) near IBS POSTECH Campus Bldg.

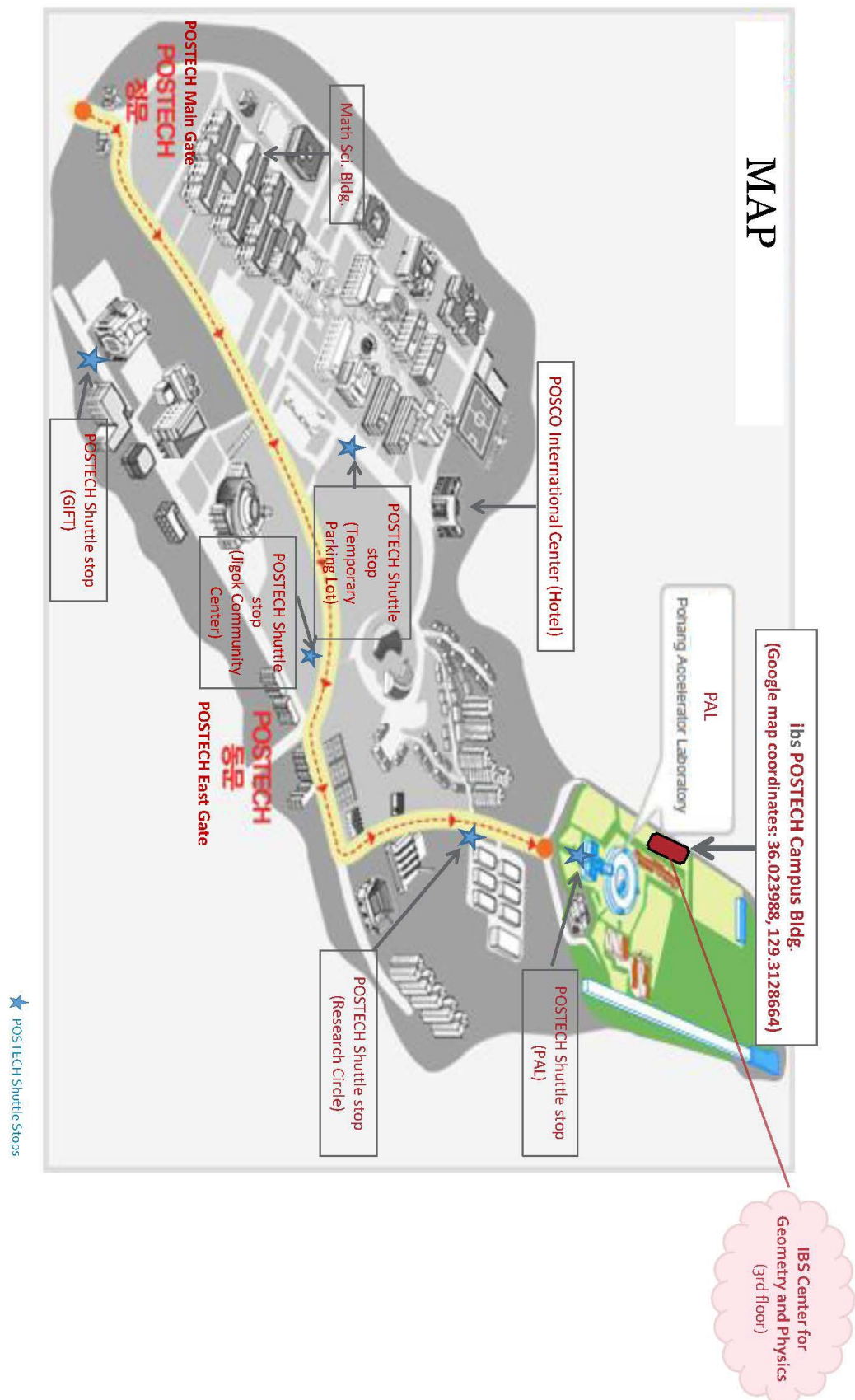


Available Offices for Participants

We have assigned the available offices for participants who may need to use the office space or the space for small discussions. The rooms marked ★ in the plan below and those labeled “For Summer Mini-school Participants” are free for you to use as needed. (Room No.: 302, 303, 315, 317)



▪ Campus Map (Location of IBS CGP):



■ Dining on campus

POSTECH Dining Services - Facilities Operation Time

Store			Operation hours		Breaktime	Closing Day
Jigok Community Center	Haedong-Aurum Hall	Full-course meals (Students only)	Breakfast	07:30~09:30 (Saturday/Sunday/Holiday 08:00~09:30)	-	Open throughout the year
			Lunch	11:30~13:30		
			Dinner	17:30~19:00		
		Bob berger	Lunch	11:30~13:30	-	Weekend/Holiday
		Chinese Cuisine	Not in operation			
		Geu Yeo Deun	Breakfast	07:30~10:30	-	Weekend/Holiday
			Lunch	11:30~13:30		
			Dinner	17:30~19:00		
		Wisdom	11:50~13:00		-	Weekend/Holiday
		GS25* (Jigok Community Center)	Staff Service	08:00~02:00	-	Open throughout the year (Closed on Lunar New Year’s Day & during Thanksgiving)
			Self-Check-out	02:00~08:00		
		BURGER KING	11:00~20:00		-	Open throughout the year
		Monet Cafe	08:00~19:00		-	Weekend/Holiday
e-Sports COLOS-SEUM	Lunch	11:30~14:00	14:00 ~17:30	Saturday(lunch)/Sunday/Holiday ※Closed on Saturdays during vacation		
	Dinner	17:30~02:00				
POSCO International Center		The Blue Hill	11:30~13:30		-	Weekend/ Holiday
Student Union Bldg	GS25* (Student Union Bldg.)		Staff Service	08:00~22:00	-	Open throughout the year
			Self-Check-out	22:00~08:00		
	coffee nearme		08:00~19:00		-	Weekend/ Holiday
	Oasis	MAKKI/ Geu Yeo Deun	11:30~13:30		-	Weekend/ Holiday
Research Bldg.		GS25* (ME Engineering Lab. Bldg.)	Staff Service	09:00~18:00	-	Open throughout the year
			Self-Check-out	18:00~09:00		
Tae-Jun Park Digital Library		GS25* Library	Staff Service	08:00~22:00 (Saturday/Sunday/Holiday 10:00~19:00)	-	Open throughout the year
			Self-Check-out	22:00~08:00 (Saturday/Sunday/Holiday 19:00~10:00)		
		coffee nearme Li-brary		08:00~21:00 (Saturday/Sunday/Holiday 10:00~17:00)		-
PAL,Science Hall		coffee nearme PAL&NINT	11:30~15:30		-	Weekend/ Holiday
Log Cabin			18:00~02:00		-	Sunday/Holiday

* GS25: Convenience Store

▪ Message for Taxi Driver When You Arrive in Pohang

Destination	Korean Sentence for the driver	What the sentence means
IBS POSTECH Campus Bldg. * IBS-CGP Admin Office #110	기초과학연구원 포스텍 캠퍼스로 가주세요. (가속기 연구소 안쪽, 선 형가속기 지나서) 감사합니다. 기초과학연구원 포스텍 캠퍼스 주소: 경북 포항시 남구 지곡로 127번길 79 (가속기 연구소 출입구 지나서 안쪽, 선형가속기 지나서)	Please take me to the IBS POS- TECH Campus Bldg. Thank you.
POSCO International Center (Hotel) at POSTECH	포항공대 포스코 국제관 호텔로 가주세요. 감사합니다.	Please take me to the POSCO In- ternational Center (Hotel). Thank you.
IBS POSTECH Campus Bldg. via POSCO International Center (Hotel) at POSTECH	포스코국제관 호텔에 잠시 들렀다 기초과학연구원 포스텍 캠퍼스(가 속기 연구소 안쪽, 선형가속기 지 나서)로 가주세요.	Please take me to the POSCO In- ternational Center (Hotel) at POSTECH
Hotel Yeongildae	호텔영일대로 가주세요.	Please take me to the Hotel Yeongildae. Thank you.
Pohang Intercity Bus Terminal	포항 시외버스 터미널로 가주세요.	Please take me to the Pohang In- tercity Bus Terminal
KTX Pohang Station	포항 KTX 역으로 가주세요.	Please take me to the KTX Po- hang Station.
(Waiting)	여기서 잠시만 기다려주세요	Please wait here for a minute.

▪ Contact

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15:30 – 16:00				
16:00 – 16:30	Break		Free Discussion	
16:30 – 17:30	Sung-Rak Choi			
17:30 – 20:00			Dinner	

Please visit our workshop website:

<https://cgp.ibs.re.kr/conferences/2024SMSAG>



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