

TENTATIVE PROGRAM

Friday, Dec 22

Departure from Hanoi

Saturday, Dec.23

- 8:00 – 9:00 Registration (also during the breaks)
- 9:00 – 9:15 Opening Ceremony
- 9:15 – 10:15 Le Thi Thanh Nhan: Some topics on local cohomology modules
- 10:15 - 10:45 Break
- 10:45 – 11:45 Tran Tuan Nam: Formal local homology
- 12:00 Lunch
- 14:00 - 15:15 Pham Hong Nam: On the length function of saturations of ideal power
- 15:15 – 15:45 Break
- 15:45 – 17:00 Tran Duc Dung: A uniform bound of reducibility index of good parameter ideals for certain modules

Sunday, Dec. 24

- 9:00 – 9:45 Nguyen Thi Hong Loan: On certain invariants of idealizations and canonical modules
- 9:45 – 10:30 Tran Do Minh Chau: On a generalization of almost Gorenstein rings
- 10:30 – 11:00 Break
- 11:00 – 11:45 Do Van Kien: On defining ideals in numerical semigroup rings of minimal multiplicity
- 12:00 Lunch
- 14:00 - 15:15 Luu Phuong Thao: Dimension, multiplicity and attached primes of local cohomology modules via certain flat extension
- 15:15 – 15:45 Break

15:45-17:00 Nguyen Tuan Long: The relationship between adjusted Hilbert coefficients and sequentially generalized Cohen-Macaulay modules

Monday, Dec. 25

9:00 – 9:45 Nguyen Thi Dung: Critical paired dominating sets and irreducible decompositions of powers of edge ideals

9:45–10:30 Pham Huu Khanh: The stability of certain sets of attached prime ideals related to cosequence in dimension $>k$

10:30 – 11:00 Break

11:00 – 11:45 Tran Nguyen An: Annihilator of Artinian modules and applications

12:00 Lunch

14:00 - 15:15 Doan Trung Cuong: Some remarks on Cohen-Macaulay rings and Macaulayfication

15:15 – 15:45 Break

15:45-17:00 Pham Hung Quy: Modules over quotients of Cohen-Macaulay local rings

19:00 - Banquet

Tuesday, Dec. 26

8:30 - 11:30 Excursion (Halong Bay or Ba Vàng Pagoda)

Departure from Tuan Chau

ABSTRACTS

Annihilator of Artinian modules and applications

Tran Nguyen An
Thai Nguyen University of Education

In this talk, we consider the annihilator of Artinian modules, especially the annihilator of Artinian local cohomology modules. We will characterize the annihilator of local cohomology modules via pseudo-supports of finitely generated modules; Give some connections between the annihilator of local cohomology modules and Artinian modules with structure of rings; Apply the annihilator of local cohomology modules and Artinian modules to study the associativity formulas for multiplicity, attached primes of local cohomology modules, support and pseudo-supports, cofinite Artinian module, Lichtenbaum-Hartshorne Vanishing Theorem, ...; Some open problems are also discussed in this talk.

On a generalization of almost Gorenstein rings

Tran Do Minh Chau
Thai Nguyen University of Education
This is a joint work with S. Goto, S. Kumashiro, and N. Matsuoka

Our aim is to discover a good candidate for natural generalization of Almost Gorenstein rings which was introduced by V. Barucci-R. Froberg and extended by S. Goto-N. Matsuoka-T. T. Phuong. We define 2-AGL rings in dimension one in terms of the rank of Sally modules of canonical ideals and the basic theory is developed. We also explore the case where the base rings are numerical semigroup rings over fields.

Some remarks on Cohen-Macaulay rings and Macaulayfication

Doan Trung Cuong
Institute of Mathematics, VAST

In this talk, we will recall some properties of Cohen-Macaulay rings which are important but seem to be not known widely especially within young commutative algebraists. Then I review some history of the Macaulayfication problem together with the main results. Finally I present some recent results on the relation between the existence of Macaulayfication and Cohen-Macaulay formal fibers of a local ring.

Critical paired dominating sets and irreducible decompositions of powers of edge ideals

Nguyen Thi Dung
Thai Nguyen University of Agriculture and Forestry
Joint work with H. L. Truong, N. T. T. Tam and H. N. Yen

Let G be a finite simple graph. A set S of vertices is a critical paired dominating set of G if every vertex is adjacent to a vertex in S and the removal of any vertex does not change the matching number of G . In this paper, we give a characterization of graph G which has a critical paired dominating set in terms of the irreducible decomposition of powers of the edge ideal associated to G .

A uniform bound of reducibility index of good parameter ideals for certain modules

Tran Duc Dung
Thai Nguyen University of Sciences

Let (R, \mathfrak{m}) be a Noetherian local ring and M a finitely generated R -module. The invariants $p(M)$ and $sp(M)$ of M were introduced in order to measure the non-Cohen-Macaulayness and the non-sequential-Cohen-Macaulayness of M , respectively. In this

talk, we prove that if $\text{sp}(M) < 1$, then there exists a constant c such that $\text{ir}_M(\mathfrak{q}M) < c$ for all good parameter ideals \mathfrak{q} of M . Here $\text{ir}_M(\mathfrak{q}M)$ is index of reducibility of \mathfrak{q} on M .

The stability of certain sets of attached prime ideals related to cosequence in dimension $> k$

Pham Huu Khanh
Tay Nguyen University

Let (R, \mathfrak{m}) be a Noetherian local ring, I, J two ideals of R , and A an Artinian R -module. Let $k \geq 0$ be an integer and $r = \text{Width}_{>k}(I, A)$ the supremum of lengths of A -cosequences in dimension $> k$ in I defined by Nhan-Hoang. It is first shown that for each $t \leq r$ and each sequence x_1, \dots, x_t which is an A -cosequence in dimension $> k$, the set

$$\left(\bigcup_{i=0}^t \text{Att}_R(0 :_A (x_1^{n_1}, \dots, x_i^{n_i})) \right)_{\geq k}$$

is independent of the choice of n_1, \dots, n_t . Let r be the eventual value of $\text{Width}_{>k}(0 :_A J^n)$. Then our second result says that for each $t \leq r$ the set

$$\left(\bigcup_{i=0}^t \text{Att}_R(\text{Tor}_i^R(R/I, (0 :_A J^n))) \right)_{\geq k}$$

is stable for large n .

On defining ideals in numerical semigroup rings of minimal multiplicity

Do Van Kien
Hanoi Pedagogical University 2
Join work with Naoyuki Matsuoka

In this talk, we focus on describing the structure of the defining ideal of the semigroup ring $R = k[H]$ of a numerical semigroup H in the case where R has minimal multiplicity.

On certain invariants of idealizations and canonical modules

Nguyen Thi Hong Loan
Vinh University

In this talk, we study the behavior of some invariants in Commutative Algebra such as the polynomial type and the polynomial type of fractions via idealizations. As applications, we characterize the Cohen-Macaulayness, generalized Cohen-Macaulayness and other properties of the idealizations.

The relationship between adjusted Hilbert coefficients and sequentially generalized Cohen-Macaulay modules

Nguyen Tuan Long
National economics university

In this talk, we are interested in The relationship between adjusted Hilbert coefficients and sequentially generalized Cohen-Macaulay modules. This talk is divided into three sections.

1. Uniform Bounds in Sequentially Generalized Cohen–Macaulay Modules.
2. On Adjusted Hilbert-Samuel Functions
3. Adjusted Hilbert-Samuel Functions and Sequentially Generalized Cohen–Macaulay Modules.

On the length function of saturations of ideal power

Pham Hong Nam
Thai Nguyen University of Sciences
Joint work with D. T. Cuong and P. H. Quy

Let (R, \mathfrak{m}) be a commutative Noetherian local ring and I be an ideal of R . There is a numerical function attached to I ,

$$h_I^0 : Z_{\geq 0} \rightarrow Z_{\geq 0}$$

$$n \mapsto l_R(R/I^{n+1})$$

If I is \mathfrak{m} -primary then $h_I^n(n) = l_R(R/I^{n+1})$ is the Hilbert-Samuel function. So it is of polynomial type, that means, there is a polynomial $H_I(n)$ such that $h_I^0(n) = H_I(n)$ for all $n \gg 0$. In general, unfortunately $h_I^0(n)$ is not always of polynomial type. In this talk, we address the question under which assumption the function $h_I^0(n)$ is of polynomial type. As the main results, we will show that $h_I^0(n)$ is of polynomial type in the following cases:

- a) The ideal I is principal;
- b) R is unmixed and the ideal I is generated by part of an almost p -standard system of parameters of R .

Formal local homology

Tran Tuan Nam

Ho Chi Minh University of Pedagogy, Ho Chi Minh city, Vietnam

We introduce a concept of formal local homology modules which is in some sense dual to P. Schenzel's concept of formal local cohomology modules. The dual theorem and the non-vanishing theorem of formal local homology modules will be shown. We also give some conditions for formal local homology modules being finitely generated or artinian.

Some topics on local cohomology modules

Le Thanh Nhan

Thai Nguyen University of Sciences

In this talk, we are interested in the themes of canonical modules, the vanishing and the annihilator, dimension, multiplicity and the finiteness properties of local cohomology modules. Our concrete aims shall be the quasi-Gorensteinness of

Noetherian local rings; the relation between the Cohen-Macaulayness of canonical modules and the uniqueness of the birational Cohen-Macaulayfication of the base ring; the effect of certain flat extensions on annihilator, dimension and multiplicity of local cohomology modules; and the finiteness and the asymptotic behavior of certain sets of prime ideals of local cohomology modules.

Modules over quotients of Cohen-Macaulay local rings

Pham Hung Quy
FPT University

In this talk, we discuss some results and questions about the structure of modules and its local cohomology when the rings are images of Cohen-Macaulay local rings.

Dimension, multiplicity and attached primes of local cohomology modules via certain flat extension

Luu Phuong Thao
Thai Nguyen College of Education
This is a joint work with Le ThanhNhan and Tran Nguyen An

It is well known that if $\varphi: (S, \mathfrak{n}) \rightarrow (S', \mathfrak{n}')$ is a flat local homomorphism of Noetherian local rings and L is a finitely generated S -module, then we have the following relations between the set of associated primes of S' -module $L \otimes_S S'$ and that of S -module L .

$$\text{Ass}_{S'}(L \otimes_S S') = \bigcup_{s \in \text{Ass}_S L} \text{Ass}(S'/sS')$$

$$\text{Ass}_S L = \left\{ \varphi^{-1}(s) \mid s \in \text{Ass}_{S'}(L \otimes_S S') \right\}$$

On the other hand, the local cohomology module $H_n^{i+r}(L \otimes_S S')$ is an Artinian S' -module and the local cohomology module $H_n^i(L)$ is an Artinian S -module, where $i \geq 0$ is an integer and $r = \dim(S'/\mathfrak{n}S')$. Moreover, the set of attached primes defined

by I. G. Macdonald for Artinian modules makes an important role similarly to that of the set of associated primes for finitely generated modules. Therefore, it is natural to ask about the relations between the sets of attached primes of these two Artinian local cohomology modules $H_n^{i+r}(\mathbf{L} \otimes_S \mathbf{S}')$ and $H_n^i(\mathbf{L})$. In this paper, we deal with the above question for the natural flat extension $\varphi: R_p \rightarrow R_p$, where (R, \mathfrak{m}) is a Noetherian local ring, M a finitely generated R -module, $P \in \text{Spec}(R)$ and $\mathfrak{p} = P \cap R$. Note that $M_{\mathfrak{p}} \otimes_{R_{\mathfrak{p}}} R_{\mathfrak{p}} \cong M_{\mathfrak{p}}$. Therefore we ask about the relations between the two sets of attached primes $\text{Att}_{R_{\mathfrak{p}}}(\mathbf{H}_{R_{\mathfrak{p}}}^{i+r}(M_{\mathfrak{p}}))$ and $\text{Att}_{R_{\mathfrak{p}}}(\mathbf{H}_{R_{\mathfrak{p}}}^i(M_{\mathfrak{p}}))$, where $r = \dim(R_{\mathfrak{p}} / \mathfrak{p}R_{\mathfrak{p}})$. Some partial answers on this question were given for the case where $r = 0$ (see [NQ]). The aim of this talk is to settle the question for the case where $r \geq 0$. We provide some connections between $\text{Att}_{R_{\mathfrak{p}}}(\mathbf{H}_{R_{\mathfrak{p}}}^{i+r}(M_{\mathfrak{p}}))$ and $\text{Att}_{R_{\mathfrak{p}}}(\mathbf{H}_{R_{\mathfrak{p}}}^i(M_{\mathfrak{p}}))$. Then we compute dimension and multiplicity of $\mathbf{H}_{R_{\mathfrak{p}}}^{i+r}(M_{\mathfrak{p}})$ respectively in terms of dimension and multiplicity of $\mathbf{H}_{R_{\mathfrak{p}}}^i(M_{\mathfrak{p}})$.

The bibliography

- [BS] M. Brodmann and R. Y. Sharp, "Local cohomology: an algebraic introduction with geometric applications", Cambridge University Press, 1998.
- [Mac] I. G. Macdonald, Secondary representation of modules over a commutative ring, *Symposia Mathematica*, **11** (1973), 23-43.
- [NQ] L. T. Nhan, P. H. Quy, Attached primes of local cohomology modules under localization and completion, *J. Algebra*, (2014), 475-485.