

# ALMOST GORENSTEIN RINGS

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This is a joint work [GMP] with Naoyuki Matsuoka and Tran Thi Phuong.

In my lecture I will talk about Cohen-Macaulay local rings of dimension one; especially, about almost Gorenstein rings with slightly generalized definition. The basic theory and the characterization of almost Gorenstein rings in terms of the first Hilbert coefficients  $e_1(I)$  of canonical ideals  $I$  shall be described. Examples of almost Gorenstein rings which are not Gorenstein will be given in the case where the rings are analytically ramified.

Originally, almost Gorenstein rings were introduced in 1997 by Valentina Barucci and Ralf Fröberg [BF], in the case where the rings are analytically unramified. They developed an interesting theory of almost Gorenstein rings and gave many inspiring results. In 2009, Valentina published one more paper [B], and provided one of their results [BF, Proposition 25] with a counterexample [B, Example, p.995]. Valentina might feel some gap in their proof. However, the counterexample itself is wrong, and after slight modification in their proof, the beautiful result holds true in full generality (cf. [B, Corollary 3.8]). To see this, we however need to generalize the notion of almost Gorenstein ring to the case where the rings are *not* necessarily analytically unramified, which I would like to talk about in my lecture.

## REFERENCES

- [B] V. Barucci, *Local rings of minimal length*, J. Algebra **213** (2009) 991–996.
- [BF] V. Barucci and R. Fröberg, *One-Dimensional Almost Gorenstein Rings*, J. Algebra **188** (1997) 418–442.
- [GMP] S. Goto, N. Matsuoka, and T. T. Phuong, *Almost Gorenstein rings and Hilbert coefficients in dimension one*, Preprint 2011.

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