

Gorenstein rings in codimension four

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I will discuss recent results and conjectures on Artin Gorenstein (AG) rings of codimension 4 and regularity at most 5. For regularity 3 and 4, we give a complete characterization of what betti tables are possible (there are 3 and 16, respectively), as well as relations in the parameter space (of the corresponding inverse quaternary cubic or quartic polynomial). While the Weak Lefschetz Property always holds for regularity at most 4, in regularity 5 it fails in interesting ways. We conjecture that for regularity 5 there are 36 possible Betti tables for AG rings, and show that for 4 of them the betti table type does not determine WLP. These results are joint work with Nancy Abdallah, Grzegorz Kapustka, Michal Kapustka, Kristian Ranestad, Mike Stillman, Beihui Yuan.