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Bijective proofs of derivative formulas for Schubert polynomials

Recently, Gaetz and Gao extended a lowering operator ∇ on weak order, first introduced by Stanley, to an $\mathfrak{sl}_2$ poset representation, thus proving the strong Sperner property of weak order. Hamaker, Pechenik, Speyer, and Weigandt later showed that ∇ can be realized as a certain differential operator on Schubert polynomials which, in particular, gives a short proof of the Macdonald reduced word identity. In this talk, we give bijective proofs of this and related derivative identities for Schubert polynomials and β-Grothendieck polynomials using the combinatorics of pipe dreams.