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Four manifolds with no smooth spines

It is an interesting question to ask whether a compact smooth 4-manifold which deformation retracts to a PL embedded closed surface contains a smooth spine, i.e. deformation retracts onto a smoothly embedded surface. In this talk, we will use Heegaard Floer homology and high-dimensional surgery theory to give some obstructions. We will also discuss some examples where the interior of the 4-manifold is negatively curved.