- **Ammann, Bernd: Moduli spaces of Riemannian and Lorentzian manifolds (SR1 c)**
  The goal of the talk is to explain some unexpected correspondences
  between moduli spaces of Riemannian and Lorentzian manifolds.
  In the first part we describe joint research with
  Klaus Kr\"oncke, Hartmut Wei\ss{} and Olaf M\"uller. Let M be a
  compact spin manifold. We consider the moduli space of Riemannian
  metrics on M carrying a (non-trivial) parallel spinor. They are Ricci-flat,
  and all known Ricci-flat compact Riemannian manifolds are -- up to a
  finite covering -- of this kind. We explain that any curve in the moduli
  space of Ricci-flat metrics with parallel spinors yields a Lorentzian metric
  with a parallel lightlike spinor on $[a,b]\times M\times (-\epsilon,\epsilon)
  $. Under some mild conditions loops in the moduli space of Ricci-flat
  metrics with parallel spinors yield a Lorentzian metric with a parallel lightl
  ike spinor on $S^1\times M\times (-\epsilon,\epsilon)$.
  In the second part we explain recent work by my student J. Gl\"ockle
  which provides non-trivial homotopy groups in the space of intial data
  sets for Lorentzian manifolds satisfying the dominant energy condition
  strictly. In general relativity, the dominant energy condition expresses
  non-negative local mass distribution. For totally geodesic spacelike
  hypersurfaces M it yields that M has non-negative scalar curvature.
  We consider the space
  $$DEC:=\{(g,k)\mid \textrm{strict dominant energy condition}\}.$$
  The pair $(g,0)$ is in DEC iff g is in $\mathcal{R}^+(M)$, the space
  of metrics on M with positive scalar curvature. We describe a map from
  the suspension of $\mathcal{R}^+(M)$ to DEC with the following
  property: if $S^k\to \mathcal{R}^+(M)$ represents a non-trivial
  homotopy class detected by an index, then we obtain a map
  $S^{k+1}\to DEC$ with „the same'' index.