

## **Time change rigidity for unipotent flows**

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Abstract: Two flows are said to be Kakutani equivalent if one is isomorphic to the other after time change, or equivalently if there are Poincare sections for the flows so that the respective induced maps are isomorphic to each other. Ratner showed that if  $G=SL(2,\mathbb{R})$  and  $\Gamma$  is a lattice in  $G$ , and if  $U$  is a one parameter unipotent subgroup in  $G$  then the  $U$  action on  $G$  equipped with Haar measure is loosely Bernoulli, i.e. Kakutani equivalent to a circle rotation. Thus any two such systems  $SL(2,\mathbb{R})/\Gamma$  are Kakutani equivalent to each other. On the other hand, Ratner showed that if  $G'=SL(2,\mathbb{R}) \times SL(2,\mathbb{R})$  and  $\Gamma'$  is a reducible lattice, and  $U'$  is the diagonally embedded one parameter unipotent subgroup in  $G'$ , then  $(G'/\Gamma', U', m)$  is not loosely Bernoulli. We show that in fact in this case and many other situations one cannot have Kakutani equivalence between such systems unless they are actually isomorphic. This is a joint work with Elon Lindenstrauss.