Generalised Hydrodynamics and Measurements of Ballistic Correlations in a Recirculating Fibre Loop

Elias Charnay, Pierre Suret, Benjamin Doyon, Thibault Bonnemain, François Copie

- Thermodynamics of soliton gases

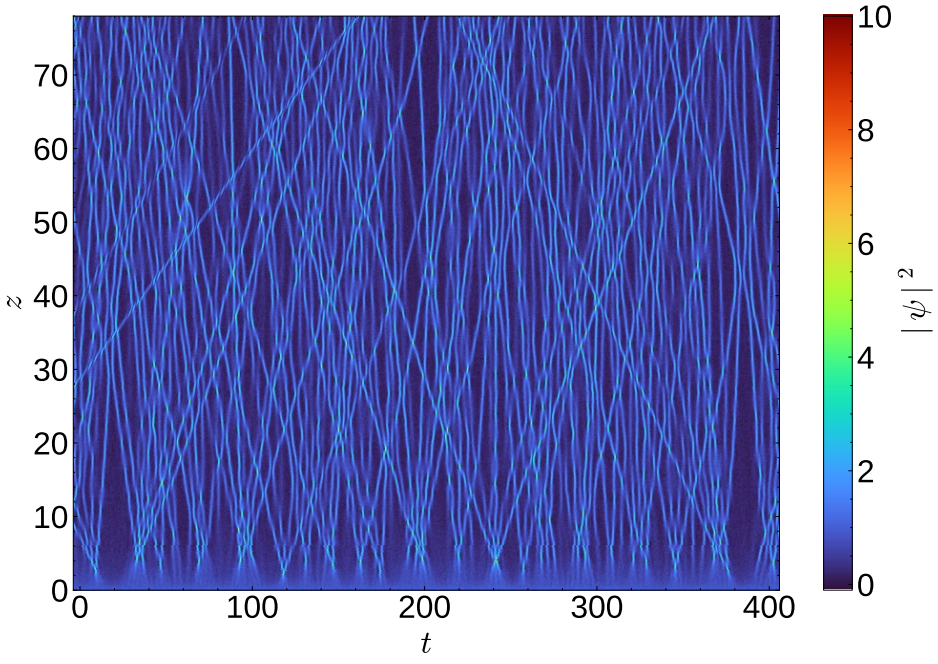
$$i\frac{\partial\psi}{\partial z}+\frac{1}{2}\frac{\partial^2\psi}{\partial t^2}+|\psi|^2\psi=0$$

- Infinitely many conserved quantities / constraints

$$e^{-\beta(H-\mu N)} \Longrightarrow e^{-\sum_{j=1}^{\infty}\beta_j Q_j}$$

- **Ballistic correlations of conserved quantities**

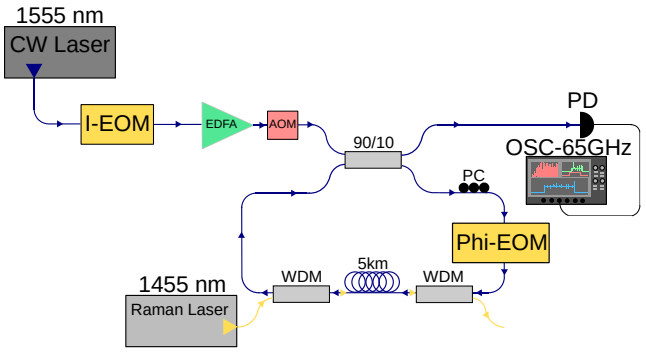
$$C_v(z)=\left\langle|\psi(t-zv,z)|^2|\psi(0,0)|^2\right\rangle_c \sim \frac{\alpha_v}{z}$$

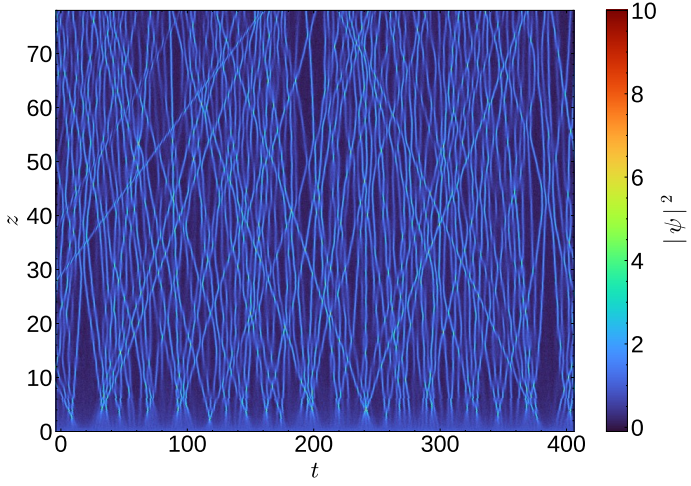


cnrs
CEMPI CENTRE EUROPÉEN POUR LES MATHÉMATIQUES, LA PHYSIQUE ET LEURS INTERACTIONS
PhLAM
Université de Lille
KING'S College LONDON

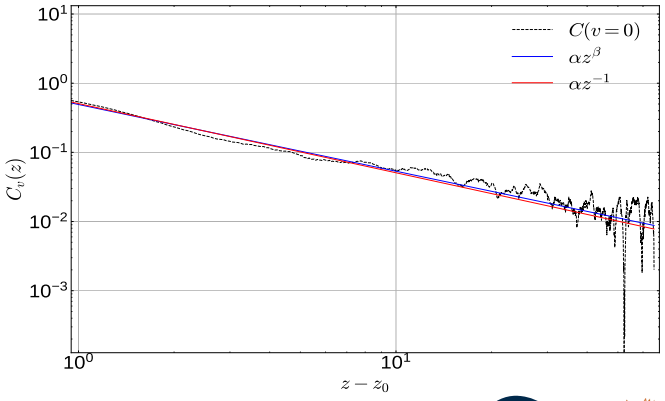
Generalised Hydrodynamics and Measurements of Ballistic Correlations in a Recirculating Fibre Loop

Elias Charnay, Pierre Suret, Benjamin Doyon, Thibault Bonnemain, François Copie





- Experimental setup : recirculating optical fibre loop
- Single shot measurement of intensity and reconstruction of space-time dynamics



- Computed correlations display a **ballistic** behaviour

cnrs
CEMPI CENTRE EUROPÉEN POUR LES MATHÉMATIQUES, LA PHYSIQUE ET LEURS INTERACTIONS
PhLAM
Université de Lille
KING'S College LONDON