Laboratoire Kastler Brossel
Physique quantique et applications

MARIE CURIE ACTIONS

Polaron residue and spatial structure in a Fermi gas

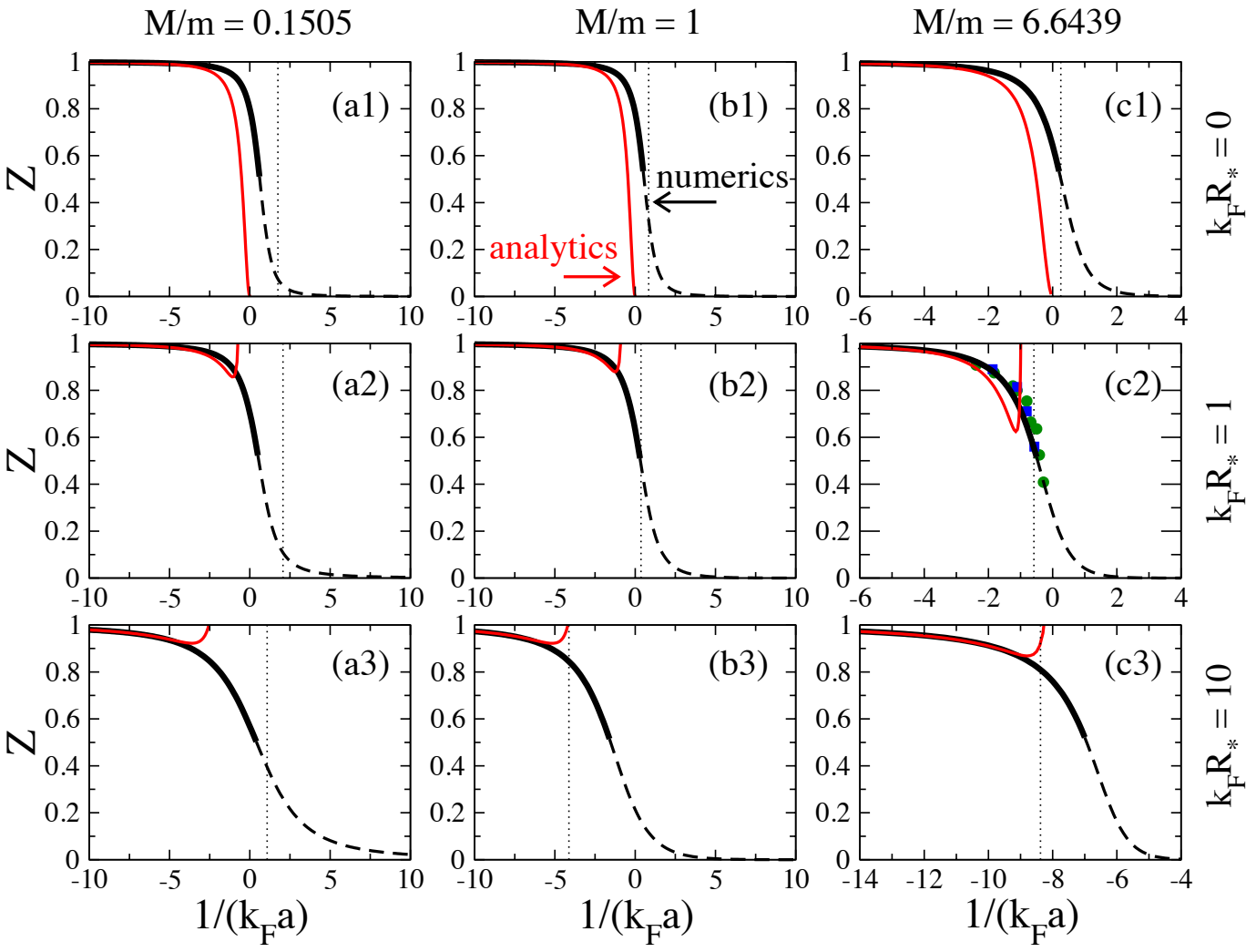
Christian Trefzger and Yvan Castin

C.T. and Yvan Castin, arXiv:1210.8179 (2012)

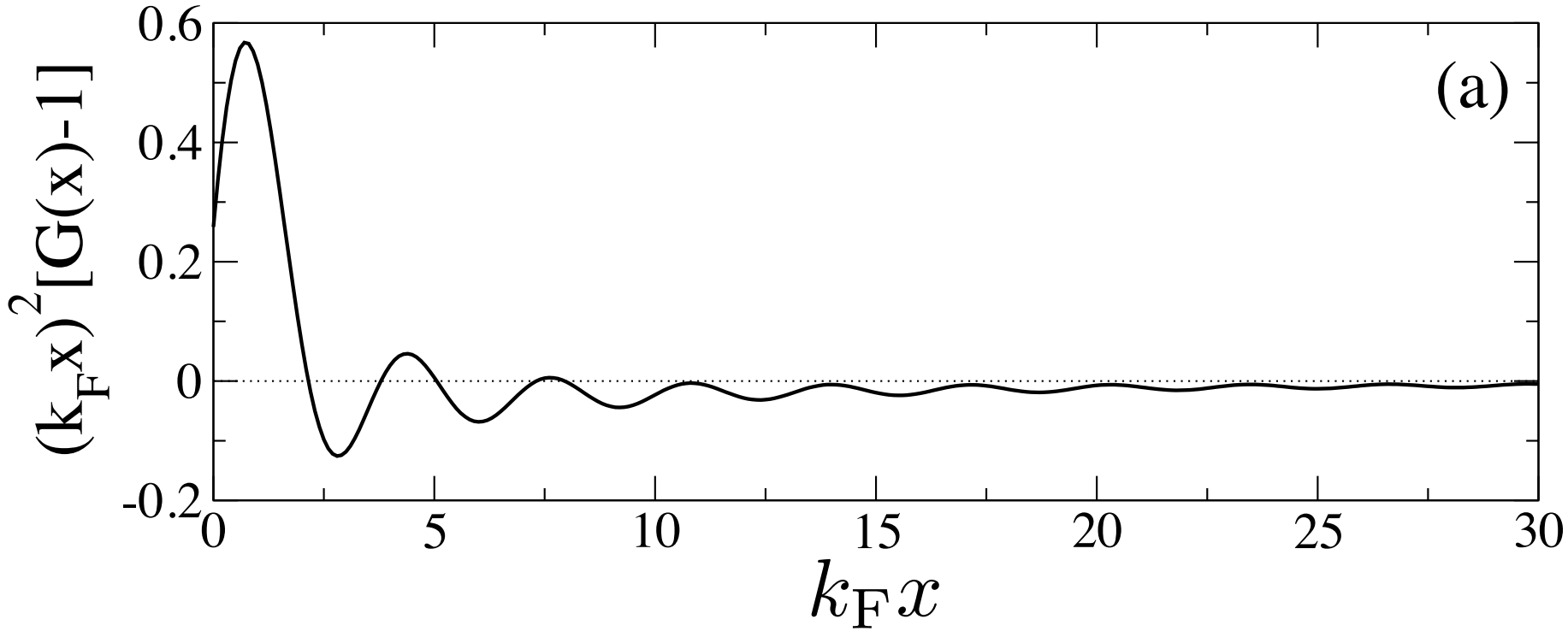
cnrs
dépasser les frontières

Institut Francilien de Recherche sur les Atomes Froids
IFRAF

Polaronic quasi-particle residue



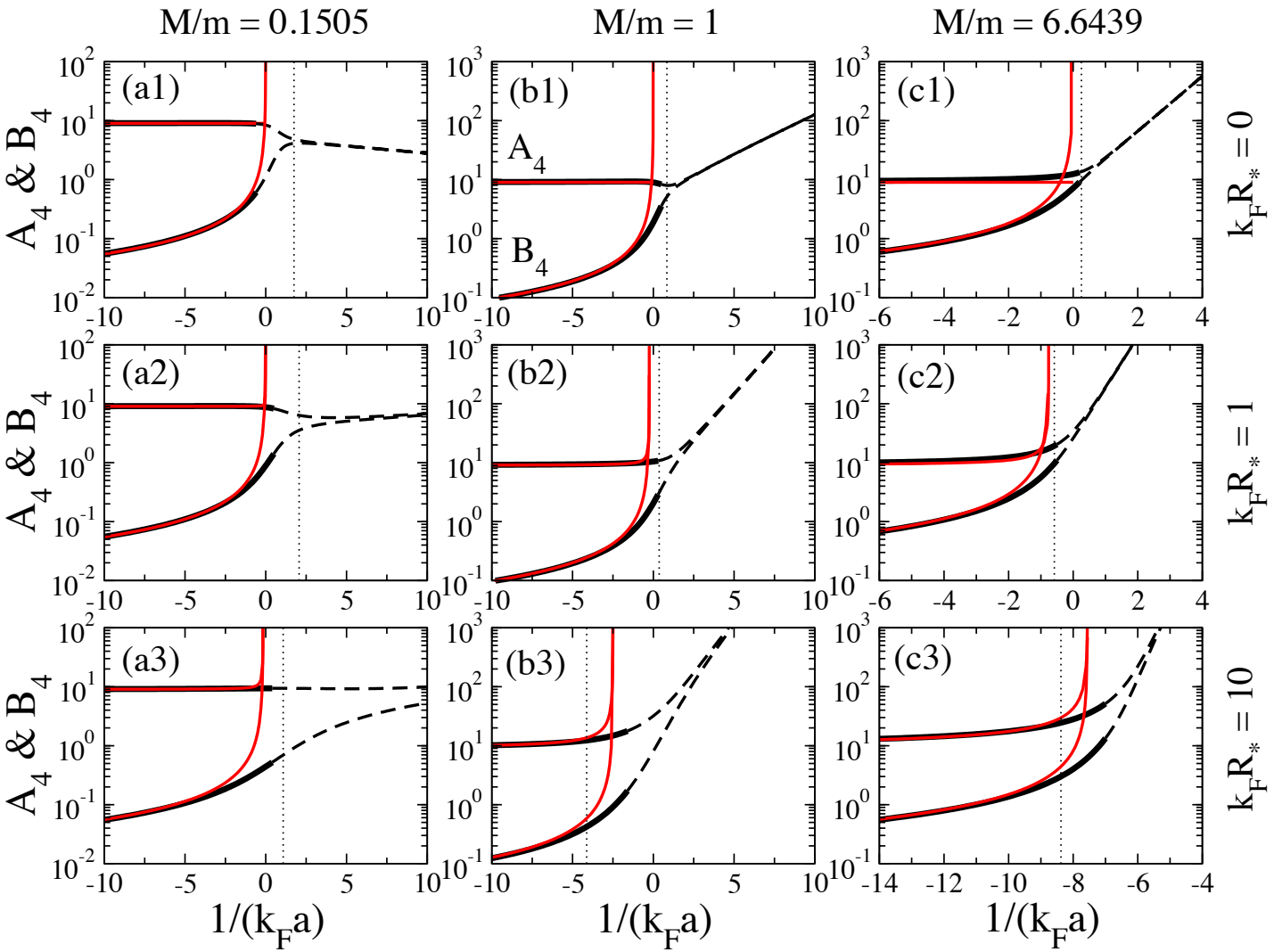
Pair correlation function



(1) Sum rule $\int d^3x[G(\mathbf{x})-\mathbf{1}]=\mathbf{0}$

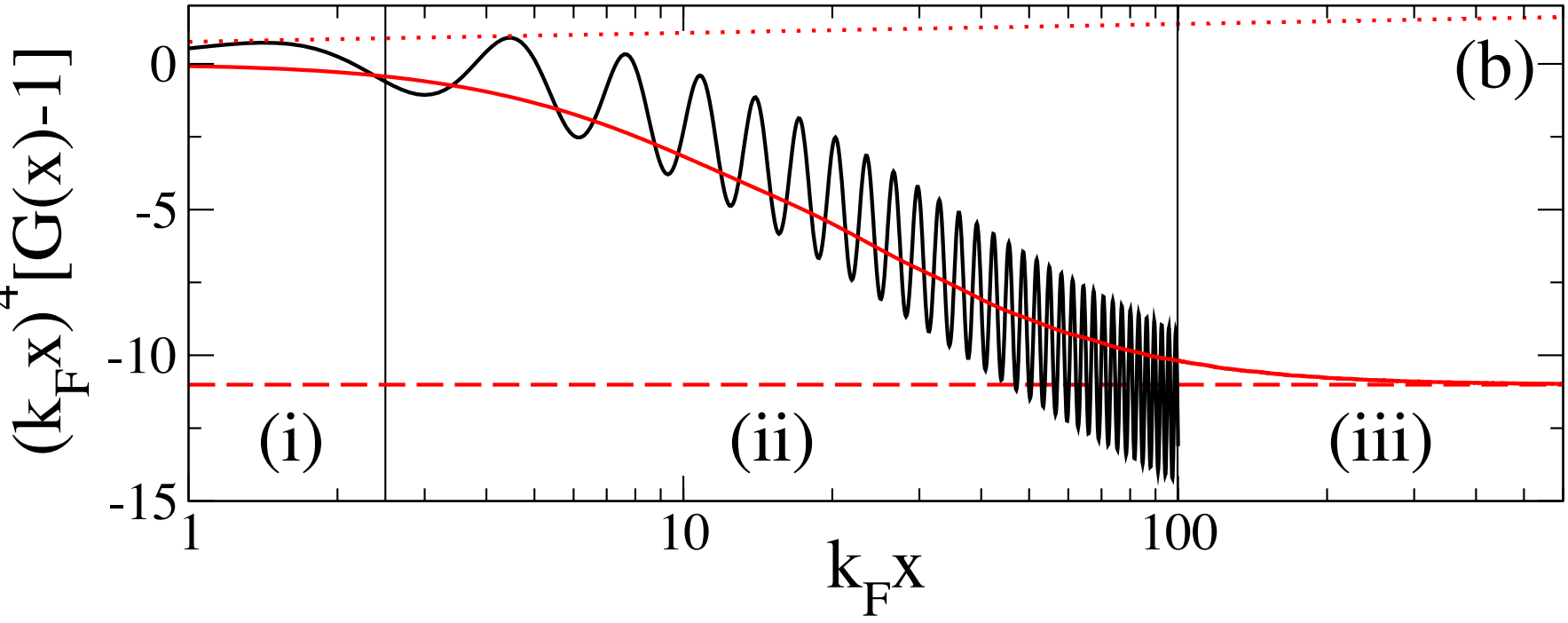
(2) Large distance $G(\mathbf{x})-\mathbf{1} \underset{\mathbf{x}\to+\infty}{\sim} -\dfrac{\mathbf{A_4}+\mathbf{B_4}\cos(\mathbf{2k_F x})}{(\mathbf{k_F x})^4}$

Pair correlation function



$$\langle x \rangle = \int d^3x\, x[G(\mathbf{x}) - \mathbf{1}] \underset{\mathbf{x}\to+\infty}{\sim} -\mathbf{A_4} \int_{\mathbf{0}}^{+\infty} \mathbf{dx} \frac{\mathbf{x^3}}{(\mathbf{k_F x})^4} \propto \mathbf{A_4} \ln(\mathbf{x})$$

Pair correlation function: Multiscale structure



$$\frac{\ln x}{x^4} \quad \text{intermediate} \quad \frac{1}{x^4}$$