Workshop
Equilibria in dispersive and fluid PDEs
La Rochelle Université
6-7-8 mars

Monday, 6 march

11h35-11h50 : Meeting point at the Amphitheâtre "Michel Crepeau" (see pages 6,7)
12h10 : Lunch (Restaurant Universitaire Antinea)
14h00-14h50 : Valeria Banica
15h00-15h50 : Lucrezia Cossetti
15h50-16h10 : Coffee time
16h20-17h10 : Elena Danesi
19h30 : Restaurant La Marie Galante (see page 8)

Tuesday, 7 march
9h00-9h50 : Louise Gassot
10h00-10h50 : Daniel Han-Kwan
11h00-11h20 : Coffee time
11h20-12h10 : Kihyun Kim
12h30 : Lunch (Restaurant Universitaire Antinea)
14h30-15h20 : Mickaël Latocca
15h30-16h20 : Annalaura Stingo
16h30 : Free time ! (work or visit La Rochelle City and its famous Aquarium, see below)
19h30 : Restaurant Bar André (see page 9)

Wednesday, 8 march
9h00-9h50 : Laurent Thomann
10h00-10h50 : Charles Collot
11h00-11h20 : Coffee time
11h20-12h10 : Abdon Moutinho
12h30 : Lunch (Restaurant Universitaire Antinea)

Valeria Banica

Blow-up for the 1D cubic NLS

We consider the cubic 1D NLS on R and prove a blow-up result for functions that are of borderline regularity, i.e. H^s for any $s < -1/2$ for the Sobolev scale and $\mathcal{F}L^\infty$ for the Fourier-Lebesgue scale. This is done by identifying at this regularity a certain functional framework from which solutions exit in finite time. This functional framework allows, after using a pseudo-conformal transformation, to reduce the problem to a large time study of a periodic Schr odinger equation with non-autonomous cubic nonlinearity. The blow-up result corresponds to a long range asymptotic completeness result for the new equation. Finally, as an application we give conditions on curvature and torsion of a smooth curve to insure the existence of a binormal flow solution that generates several singularities in finite time. This is a joint work with Renato Lucà, Nikolay Tzvetkov and Luis Vega.

Lucrezia Cossetti

A limiting absorption principle for time-harmonic isotropic Maxwell and Dirac equation

In this talk we investigate the $L^p - L^q$ mapping properties of the resolvent associated with the time-harmonic isotropic Maxwell and perturbed Dirac operator. As spectral parameters close to the spectrum are also covered by our analysis, we establish a $L^p - L^q$ type limiting absorption principle for these operators. Our analysis relies on new results for Helmholtz systems with zero order non-Hermitian perturbations. The talk is based on a joint work with R. Mandel and on an ongoing project with R. Mandel and R. Schippa.

Elena Danesi

TBA

Louise Gassot

Zero-dispersion limit for the Benjamin-Ono equation on the torus

We discuss the zero-dispersion limit for the Benjamin-Ono equation on the torus given a bell-shaped initial data. We prove that the solutions admit a weak limit as the dispersion parameter tends to zero, which is explicit and constructed from the Burgers' equation. The approach relies on the complete integrability for the Benjamin-Ono equation from Gérard, Kappeler and Topalov, and also on the spectral study of the Lax operator associated to the initial data in the zero-dispersion limit.

Daniel Han-Kwan

TBA

Kihyun Kim

Rigidity of long-term dynamics for the self-dual Chern-Simons-Schrödinger equation within equivariance

We consider the long time dynamics for the self-dual Chern-Simons-Schrödinger equation (CSS) within equivariant symmetry. Being a gauged 2D cubic nonlinear Schrödinger equation (NLS), (CSS) is L2-critical and has pseudoconformal invariance and solitons. However, there are two distinguished features of (CSS), the self-duality and non-locality, which make the long time dynamics of (CSS) surprisingly rigid. For instance, (i) any finite energy spatially decaying solutions to (CSS) decompose into at most one(!) modulated soliton and a radiation. Moreover, (ii) in the high equivariance case (i.e., the equivariance index = 1), any smooth finite-time blow-up solutions even have a universal blow-up speed, namely, the pseudoconformal one. We explore this rigid dynamics using modulation analysis, combined with the self-duality and non-locality of the problem.

Mickaël Latocca

Regularity of the Pressure in the Incompressible Euler Equation in a Bounded Domain

In an incompressible fluid, the pressure is governed by the elliptic equation $-\Delta p = \operatorname{div}\operatorname{div} u \otimes u$ and a Neuman-type boundary condition, where u stands for the divergence-free velocity vector field. The main goal of this talk is to explain why one expects that p has Double Hölder regularity (with respect to that of u) and how one can rigourously prove such a fact in a bounded domain. The results presented in this talk were obtained in collaboation with Luigi De Rosa (Basel) and Giogio Stefani (SISSA).

Annalaura Stingo

Almost-global well-posedness for $2d$ strongly-coupled wave-Klein-Gordon systems

In this talk we discuss the almost-global well-posedness of a wide class of coupled Wave-Klein-Gordon equations in $2 + 1$ space-time dimensions, when initial data are small and localized. The Wave-Klein-Gordon systems arise from several physical models especially related to General Relativity but few results are known at present in lower space-time dimensions. Compared with prior related results, we here consider a strong quadratic quasilinear coupling between the wave and the Klein-Gordon equation and no restriction is made on the support of the initial data which only have a mild decay at infinity and very limited regularity. This is a joint work with M. Ifrim.

Laurent Thomann

Almost sure scattering for the 1D nonlinear Schrödinger equation

I will present some results on the 1D nonlinear Schrödinger equation with a nonlinearity of degree $p > 1$. I will define measures on the space of the initial data for which we can describe the nontrivial evolution by the linear Schrödinger flow and show that their nonlinear evolution is absolutely continuous with respect to this linear evolution. We deduce from this precise description decay estimates implying the globally well-posedness of the equation for $p > 1$ with scattering for $p > 3$. This is joint work with Nicolas Burq (Université Paris-Saclay).

Charles Callot
TBA

Abdon Moutinho
On the collision of two kinks for the ϕ^6 model with equal low speed

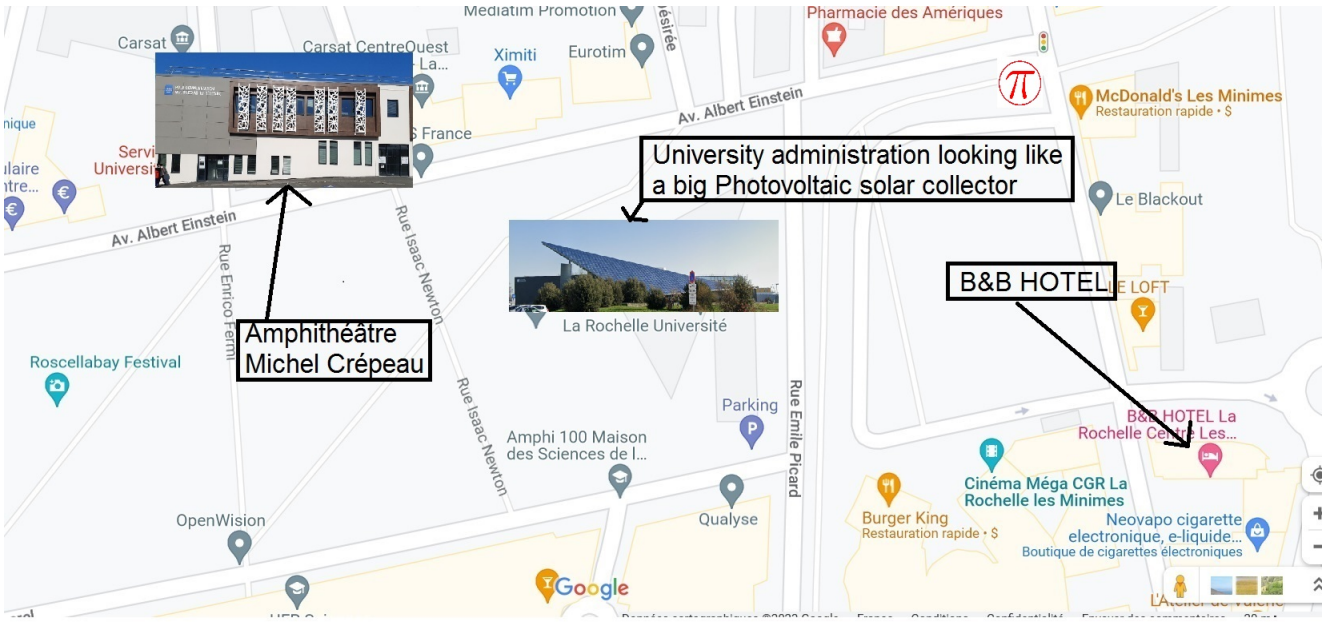
We will talk about our results on the elasticity and stability of the collision of two kinks with low speed $v > 0$ for the nonlinear wave equation of dimension 1+1 known as the ϕ^6 model. We will show that the collision of the two solitons is "almost" elastic and that, after the collision, the size of the energy norm of the remainder and the size of the defect of the speed of each soliton can be, for any $k > 0$, of the order of v^k if v is small enough.

This talk is based on our current works:

On the collision problem of two kinks for the ϕ^6 model with low speed
[https://arxiv.org/abs/2211.09749]

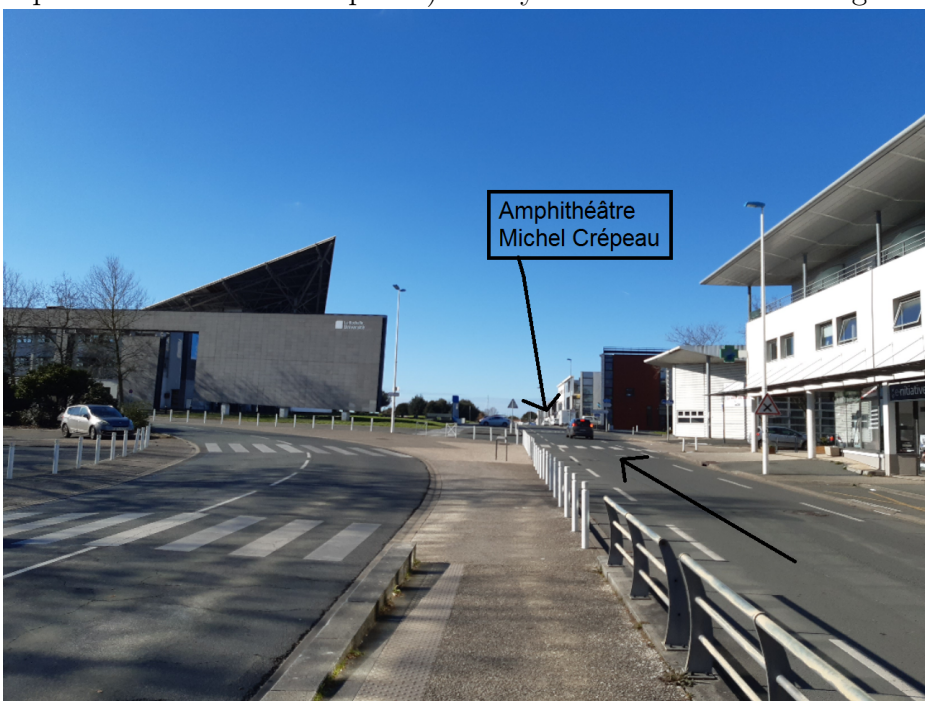
Approximate kink-kink solutions for the ϕ^6 model in the low-speed limit
[https://arxiv.org/abs/2211.09714]

Around the university



Amphithéâtre Michel Crépeau : Avenue Albert Einstein
B&B Hôtel La Rochelle Centre Les Minimes : 49 Rue de la Scierie , Z.A. des Minimes

When you come from "Gare de La Rochelle", you should be near a McDonald's (see the point π in the above photo) then you should see something like that :



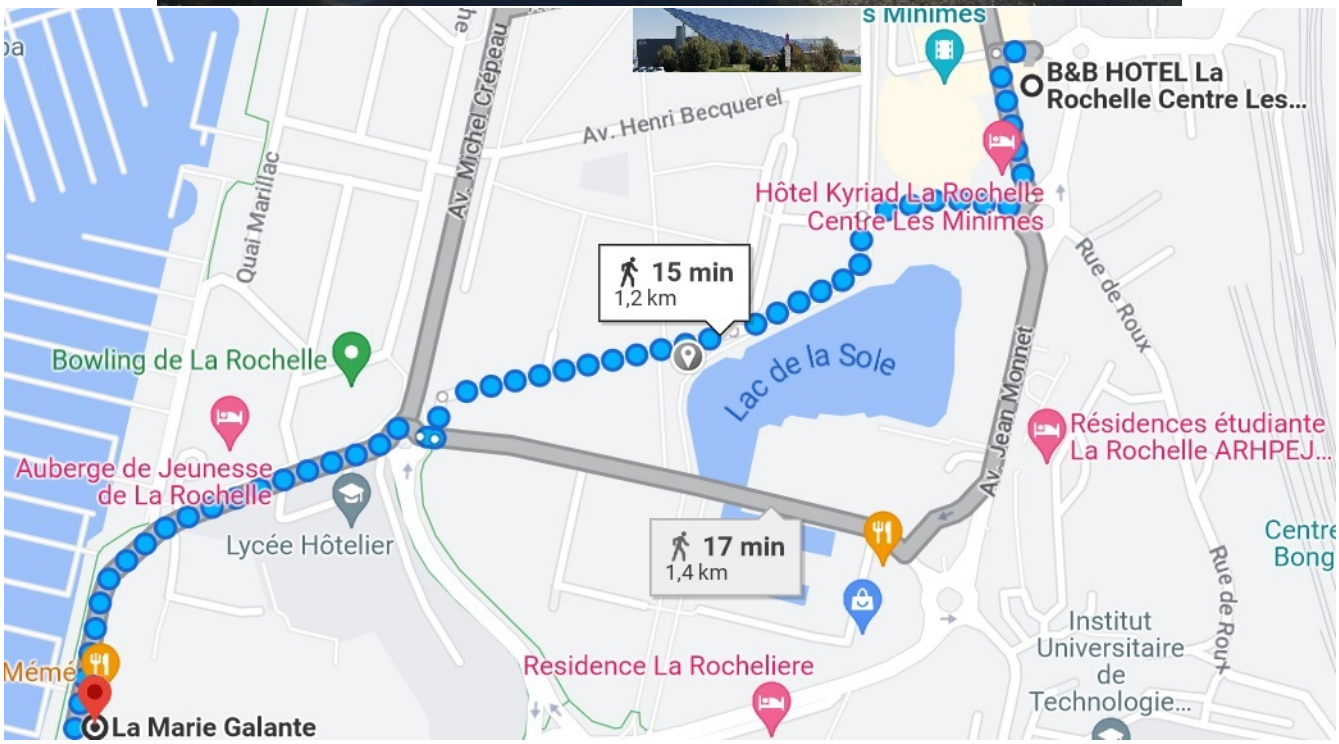
From "La Gare de La Rochelle" to "Amphithéâtre Michel Crépeau" (about 20 min)

Although not the shortest way via Google Maps, the previous way is probably the best one if you come with luggage !

About the Aquarium of La Rochelle : last entries at 18h30, about 1h of visit for 17.50 EUR if you are interested in.

Restaurants

Monday, 6 March **19h30**
Adress : La Marie Galante, 35 Av. des Minimes, 17000 La Rochelle



Tuesday, 7 March **19h30**
Adress : Bar André 5 Rue St Jean du Pérot, 17000 La Rochelle