Prepared in 2025 for the IRB Barcelona Artist in Residence Programme, the following proposal articulates a structural perspective that emerged through many years of sculptural practice and exploratory material engagement, and which continues to inform the present work.

Addressing concepts such as state spaces, environmental coupling, landscape plasticity, and nontrivial dynamics across different structural domains, the text was developed through a dialogue between the ongoing structural research and the field of molecular biophysics. Not only do these questions occupy a central position within both domains, but their convergence also carries broader implications for how complex systems, order, function, and material behavior may be approached today.

While originally written for a specific context, the document is published here as part of the broader body of work.

IRB Barcelona
Artist in Residence Programme 2026

Project Proposal

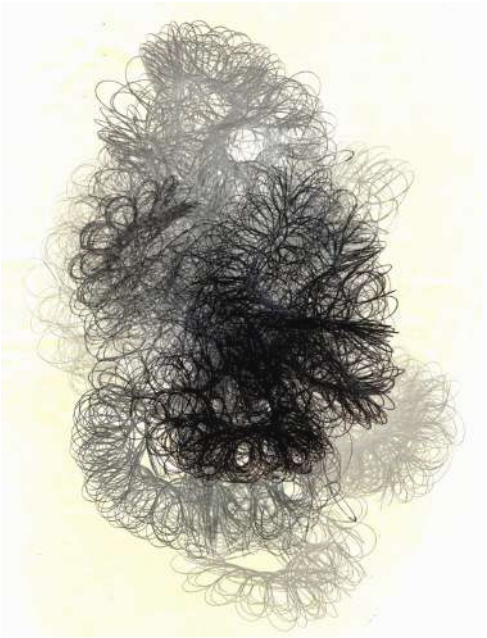

Image: Transformable bending-active structure, multiple configurations during active manipulation. Cité internationale des arts, Paris, 2020.

Artist

Kristoffer Stefan

Project title

RESPONDING LANDSCAPE PLASTICITIES

Accessing nontrivial dynamics across structural domains

Project aim

Many complex systems we encounter today are described as unstable or disordered because they resist fixed descriptions and stable states. Rather than treating this as a deficit, the project approaches such behaviour as an invitation to reconsider how order, function, and interaction emerge through sensitivity to context and change.

Conceived as a site-responsive artistic research, the project actively joins this broader shift of perspective. It investigates how adaptive material systems and molecular structures exhibit nontrivial dynamics shaped by evolving stability landscapes and environmental coupling.

Anchor field / researchers

Laboratory of Molecular Biophysics, Xavier Salvatella
(with openness to broader engagement across IRB Barcelona)

Residency format

Site-responsive artistic research, up to three months, full-time presence on site at IRB Barcelona, scheduled in agreement with the IRB Barcelona coordination team.

Project structure

Residency phase I: Orientation and immersion (on site at IRB Barcelona)

Residency phase II: Sustained material and research engagement

Residency phase III: Consolidation and articulation of post-residency directions

Post-residency phase: Independent development and production of the final artwork, leading to a public exhibition at IRB Barcelona within one year of the residency's completion

Expected outcomes

On-site development of adaptive, multistable material systems

An evolving archive of structures, mechanisms, and process documentation

Post-residency development of a final sculptural or installation-based artwork

Public exhibition at IRB Barcelona within one year of residency completion

Anticipated character of the final artwork

The final artwork is expected to arise directly from the sculptural practice developed on site and may take the form of an interactive or participatory sculptural installation. Visitors may engage with adaptive, multistable material structures whose behaviour unfolds through environmental coupling, in which the visitors themselves become part of the environment to which the structures respond.

Funding

The residency itself does not rely on additional funding beyond the support provided by IRB Barcelona. Additional mobility and/or production funding may be pursued in parallel to support post-residency development of the final artwork, without affecting the feasibility or completion of the residency project.

RESPONDING LANDSCAPE PLASTICITIES
Accessing nontrivial dynamics across structural domains

Kristoffer Stefan

1. Introduction

The proposed residency is grounded in a structural alignment between molecular biophysics and my own material practice: both engage systems whose behaviour cannot be reduced to a single stable form. Just as in proteins and other macromolecular structures, where function and reactivity arise through conformational dynamics – transitions, local or provisional stabilisations, and ensembles of transient states – the character of multistable bending-active arrangements is likewise not based on fixed geometries, but emerges only through comparable dynamics. Here, spatial alignment is not a given but results from the continuous redistribution of forces and repeated regime shifts across a wide landscape of possible configurations. Crucially, in both domains, dynamic behaviour is not governed by such internal relations alone. On the contrary, it is often decisively shaped through coupling with the environment: it is the surrounding conditions that modulate which barriers are crossed, which states become stabilised, and which pathways of change are taken.

This focus finds a particularly clear and productive site in the work of IRB's Laboratory of Molecular Biophysics, and specifically in the research led by Xavier Salvatella. It is here that questions of therapeutic applicability are inseparable from structural dynamics. Precisely within this context, a shared language of energy landscapes, state spaces, and plasticity can adequately unfold, providing a common ground on which molecular research and experimental material practice can meaningfully meet. Moreover, from the study of intrinsically disordered proteins to questions surrounding the emergence of resistance to inhibitors through adaptation, the laboratory's work, much like my own practice, consistently addresses how structural intricacies are rendered intelligible and how structural behaviour can evolve in response to a changing environment.

Against this background, the residency is conceived as a situated process of structural inquiry unfolding in close proximity to ongoing research endeavours. The work involves the development, fabrication, and exploration of adaptive material systems on site, while IRB's investigations into molecular dynamics are welcomed to actively shape the direction of the artistic work itself. In this sense, the project engages both with the content of the research and with the methods through which dynamic behaviour is accessed – observing how questions are formulated, how uncertainty is handled in practice, and how structural dynamics are modelled, tested, and interpreted. Importantly, the project does not treat artistic and scientific work as inherently separate domains that merely exchange insights from a distance. Rather, it seeks to establish a shared space of structural understanding in which both – despite working in different media – operate within the same form of conceptualising material behaviour. It is within this shared terrain that the project can proceed openly without the need for direct structural translation, while remaining attentive to both convergence and divergence between domains, and oriented toward discovering what becomes possible when the same structural logic unfolds through distinct forms of exploratory engagement.

2. Sculptural Practice and Conceptual Embedding

The artistic practice brought into the residency works with multistable bending-active arrangements whose behaviour unfolds through internal force redistribution in continuous coupling with their surroundings. Local manipulations do not remain local: interventions propagate through the entire system, shifting load paths, altering stability conditions, and reorganising the overall configuration. In this sense, the practitioner occupies an ambiguous position, simultaneously participating in the internal force relations of the structure, and acting as part of the environment to which the very same structure responds.

Exploration therefore proceeds through direct haptic engagement and deliberate perturbation. What lies beyond a given configuration is rarely accessible in advance: the surrounding stability landscape extends further than can be inferred from any single state. New regimes of organisation are reached only by driving the system out of familiar configurations – allowing it to tip, reorganise, and settle into a different temporary alignment. In this regard, the practice resonates with research strategies such as conformational flooding, albeit pursued haptically rather than numerically: while molecular dynamics simulations systematically drive and explore conformational space computationally, here comparable exploration unfolds through direct material interaction.

Crucially, the variety of possible configurations is not fixed, but the stability landscape itself is subject to change. This occurs first through deliberate structural modification: shifting connection points or small variations in the construction can profoundly affect how forces are distributed and which configurations become accessible. In some cases, such changes are explored by incrementally modifying a structure; in others, by constructing a new instance altogether in order to probe the effects of these altered conditions. However, even in the absence of direct intervention, these prestressed material systems undergo gradual internal change. Through material phenomena such as creep, or small adjustments of joints under sustained torsional forces, internal force relations can shift slowly yet decisively over time. As a result, stability conditions drift: energy barriers may lower, basins may widen, and configurations that were previously unstable can develop into metastable regimes. Each transition leaves traces that influence subsequent behaviour, particularly at points where pathways bifurcate: whichever route is taken introduces bias into the system, altering the likelihood of future transitions.

This dynamic becomes particularly relevant once questions of functionality are brought into view. Whether we look at building structures in relation to our society, or proteins embedded in the cellular milieu – as stability landscapes shift, functional behaviour cannot be understood independently of the respective environments in which these structures operate. When, for example, the internal setup of an adaptive architectural system changes, the ways in which it can be used shift accordingly. Crucially for the project at hand, comparable dynamics are encountered in molecular systems: phenomena such as the emergence of novel enzymatic function or the development of resistance to inhibitory processes could likewise be related to landscape plasticity under environmental coupling.

Despite clear differences in scale, materiality, and energetic regime, these parallels are not metaphorical. In both molecular biophysics and bending-active material exploration, energy landscapes correspond directly to spatial arrangements and force relations. Structural behaviour is governed by how components interact, how constraints are imposed or relaxed, and how environments modulate which configurations become accessible. The alignment lies not in appearance, but in an underlying logic of nontrivial order – one in which structure, change, and context are inseparable.

3. Residency Process

Structured around the notions of nontrivial dynamics and co-evolving landscape plasticities, the residency follows a mode of working in which processes of change and mutual influence are not merely observed, but enacted. Rather than treating mutual responsiveness as an object of study, the project takes it as its operating principle: it unfolds through ongoing adjustment to the research environment, to emergent material behaviour, and to what arises through the interaction between the two. In this sense, the residency does not begin from a fixed trajectory or aim toward a predetermined outcome, but remains deliberately open to being redirected by what is encountered on site.

Accordingly, the residency is conceived as a situated presence within the research environment at IRB Barcelona. The work will be anchored at the Laboratory of Molecular Biophysics, while remaining open to encounters with other groups in order to situate the inquiry within a broader range of research perspectives. This presence on site is intended to be largely independent and exploratory: following research processes as they unfold, attending discussions, observing experimental and computational workflows, as well as organizing interviews and engaging in exchanges around how structural dynamics are accessed, modelled, and interpreted. Given the wider aim of the project, particular attention will be given to how uncertainty is handled in practice – how hypotheses are formed, how systems are probed beyond familiar regimes, and how structural behaviour is both inferred and actively intervened in under conditions of partial understanding.

At the core of the project, sculptural work will take place on site through the iterative construction and modification of adaptive bending-active arrangements. These material systems are not developed as direct representations of specific molecular entities, but as experimental devices for engaging comparable structural questions through a different mode of investigation. By deliberately perturbing these systems – pushing them beyond familiar configurations, allowing them to reorganise, and observing how new regimes of stability emerge – this exploratory practice functions as a material-semiotic form of inquiry. In this way, encounters with molecular research may influence how these structures are explored and interpreted, while material experimentation may, in turn, offer alternative perspectives on questions of accessibility, bias, material agency, and historical contingency.

The residency unfolds by allowing artistic and scientific practices to gradually become familiar with one another. Through this process, the aim is neither to proceed along two parallel tracks nor to arrive at an immediate convergence toward a single outcome, but to enable the gradual formation of a shared space of understanding in which different modes of inquiry can be navigated in relation to one another. Within this evolving context, artistic experimentation and molecular research may begin to condition each other more directly: material exploration can introduce alternative ways of probing, stressing, or accessing dynamic behaviour, while scientific practices provide their own frameworks for modelling, testing, and interpretation. This mutual exposure is not conceived as a service relationship on either side, nor as a process of translating, illustrating, or disseminating results, but as an imprint on how questions are posed, how dynamics are approached, and how intricate structural behaviour is rendered accessible.

In practical terms, the residency will unfold through several overlapping phases across its three-month duration. An initial phase of approximately three weeks will focus on orientation and immersion: establishing a presence within the anchor laboratory, becoming familiar with ongoing research questions, and setting up the material workspace. During this period, first material structures will be developed on site, both as a means of initiating the sculptural inquiry, and of introducing interested researchers to the dynamics and modes of engagement characteristic of the practice. At the same time, initial conceptual threads and points of resonance will be identified and tracked as they begin to emerge. This will be followed by a longer phase of sustained engagement, in which material experimentation, observation, dialogue, and participation in research contexts deepen in parallel. During this phase, the inquiry expands beyond initial points of contact to engage a wider range of practices and perspectives within the institute, while also becoming

more focused: material systems are further developed and probed, research processes are followed in greater depth, and an evolving archive of structures, mechanisms, notes, and recordings is assembled. In the final weeks of the residency, emphasis will shift toward consolidation. Material and conceptual developments are gathered and reviewed, remaining questions are articulated, and the main dimensions that have emerged throughout the residency – whether resolved or still open – are identified and discussed with collaborators. This concluding phase establishes the transition into the post-residency period, during which the insights and material generated on site will be revisited and further developed toward a final artwork.

With its conceptual and material foundations laid during the residency, the development of a final object or installation forms an integral part of the project. In accordance with the framework of the programme, however, the precise focus of the artwork will be articulated in the post-residency phase, when the emphasis shifts from open exploration toward production. The final work may take the form of an interactive or participatory sculptural installation, in which visitors can themselves act as part of the environment of multistable, contingent structures, engaging directly with dynamics that are analogous in their structural logic to those explored during the residency. The production of the final work will proceed independently, including the pursuit of additional funding where necessary, with the aim of exhibiting it at IRB Barcelona within one year of the residency's completion.