

To: Research Team
From: Jonathan Washburn, Recognition Physics Institute
Date: February 11, 2026
Subject: Collaborator Profile for the CPM Paper — Who Should Work on This?

Executive Summary

This memo identifies the mathematician / physicist specialty profile best suited to collaborate on, review, or extend *The Coercive Projection Method: Axioms, Theorems, and Applications*. The recommendation is based on the paper's actual mathematical content, not its RS framing.

1 The Paper's Core Mathematics

The CPM paper's machinery decomposes into four layers:

1. **Convex optimisation on structured cones.** Projection bounds, ε -nets on Grassmannians, rank-one / Hermitian estimates.
2. **Coercivity inequalities.** Energy gaps controlling defect with explicit constants $(C_{\text{proj}}, K_{\text{net}}, C_{\text{eng}})$.
3. **Local-to-global aggregation.** Dispersion bounds, finite covering arguments, singular-series lower bounds.
4. **Four domain instantiations.** Calibrated currents (Hodge), circle method (Goldbach), boundary certificates (Riemann Hypothesis), critical Sobolev estimates (Navier–Stokes).

2 Best-Fit Specialties

Tier 1 — Direct match

Functional analysis / Operator theory

The Schur certificates, bounded-real lemmas, KYP/LMI machinery, and the entire RSA audit architecture live here. Someone who works with Hardy spaces, Pick interpolation, or dissipative operators would read this paper natively.

Convex geometry / Geometric measure theory (GMT)

The calibrated cone structure, ε -net covering arguments, and the Hodge instantiation (calibrated currents, comass minimisation) are squarely in this field. Think someone in the Almgren–De Lellis–Spadaro lineage.

PDE / Calculus of variations

The coercivity-from-energy-gap pattern is bread and butter for someone who works on regularity theory, Γ -convergence, or variational methods. The Navier–Stokes instantiation speaks directly to this audience.

Tier 2 — Strong overlap

Analytic number theory

The Goldbach/RH instantiations use the circle method, major/minor arc decomposition, large

sieve inequalities, and L -function boundary behaviour. A number theorist in the Vaughan / Iwaniec tradition would engage with half the paper immediately.

Control theory / Systems theory

The bounded-real lemma, state-space realisations, Lyapunov / storage certificates, and the LMI feasibility formulation are standard tools for a controls mathematician. They would see CPM as a new application of robust control machinery.

Optimisation / Semidefinite programming

The finite certification step (checking that a semidefinite matrix inequality holds) is a computational convex optimisation problem. Someone in the Vandenberghe / Boyd tradition would see this as a natural application.

Tier 3 — Good fit with some translation

Complex geometry / Algebraic geometry

For the Hodge instantiation specifically. Someone who works on Hodge theory, calibrations, or algebraic cycles.

Mathematical physics / Spectral theory

The sensor-as-reciprocal pattern and the Cayley transform are natural to someone who works with resolvents, scattering theory, or spectral zeta functions.

3 Summary Table

Tier	Specialty	Paper entry point
1	Functional analysis / Operator theory	Schur certificates, KYP/LMI
1	Convex geometry / GMT	Calibrated cones, ε -nets, Hodge case
1	PDE / Calculus of variations	Coercivity inequalities, Navier–Stokes case
2	Analytic number theory	Circle method, Goldbach/RH cases
2	Control theory / Systems theory	Bounded-real lemma, state-space realizations
2	Optimisation / SDP	Finite certification as SDP feasibility
3	Complex / Algebraic geometry	Hodge conjecture instantiation
3	Mathematical physics / Spectral theory	Resolvent / Cayley transform machinery

4 The Ideal Collaborator

The **ideal collaborator** is a **functional analyst or GMT person who also has taste for explicit constants** — someone in the tradition of:

- **Keith Ball** — convex geometry, functional analysis
- **Emmanuel Candès** — convex optimisation, structured recovery
- **Camillo De Lellis** — geometric measure theory, calibrations
- **Terence Tao** — analysis broadly, especially structure/randomness decompositions (which is exactly the CPM pattern)

The CPM pattern — *decompose into structured + error, control error by dispersion, aggregate to global* — is literally the Tao “structure vs. randomness” philosophy made into a formal proof kernel. A young analyst or GMT postdoc who works on quantitative regularity with explicit constants would be the perfect person to sharpen the domain instantiations and push toward publication.

5 Presentation Advice

For a talk audience: present it to an *analysis seminar* (PDE, harmonic analysis, or geometric analysis), not a physics seminar. The physics connection (RS bridge) is the motivation, but the paper’s strength is pure mathematics — and that is where it should be evaluated first.

For a journal: target *Journal of Functional Analysis*, *Advances in Mathematics*, or *Communications in Mathematical Physics* (the last if the RS bridge is included as motivation). The domain instantiations (Hodge, RH, Goldbach, Navier–Stokes) make the paper automatically relevant to any broad-scope analysis journal.