# Chen-Zhu Xie 谢尘竹

Portfolio:
Scholar:
Preference:
Contact:
Personality: aries INTP ab


## Education

**Nanjing University** — **College** of Engineering and Applied Sciences — Nanjing, Jiangsu

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|---|---|---|---|---|
| *Doctor of Philosophy* | *Optical Engineering* | *Q.E. – Top 15%* | Nonlinear Fourier Optics | 2025 '27 |

**Dissertation:** "Analytic 3D vector linear non-uniform & nonlinear Fourier crystal optics in arbitrary $\bar{\bar{\varepsilon}}, \bar{\bar{\chi}}$ dielectrics"

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|---|---|---|---|---|
| *Master 's Studies* | *Quantum Electronics* | *Courses Score – 93.5* | THz OAM Source | 2022 '24 |

**Northeastern University** — **School** of Physics, **College** of Science — Shenyang, Liaoning

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|---|---|---|---|---|
| *Bachelor of Science* | *Applied Physics* | *GPA Rank – 1/400* | DDTank Aimbots | 2020 '22 |

**Thesis:** "Research & design of nonlinear holography based on lithium niobate 3D nonlinear photonic crystal"

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|---|---|---|---|---|
| *Freshman in College* | *Science* | *Sichuan Prov. – Top 2%* | 7 Notes → 3 Books | 2016 '18 |

## Research Projects

**3D Vector Nonlinear** Fourier Crystal Optics — **Solving** $\left[(\nabla\times)^2 - k_0^2\bar{\bar{\varepsilon}}\cdot\right]\boldsymbol{E}(\boldsymbol{r}) = k_0^2\bar{\bar{\chi}}:\mathcal{F}_\omega^{-1}\left[\widetilde{\boldsymbol{E}}_{\mathrm{p}}\widetilde{\boldsymbol{E}}_{\mathrm{p}}\right](\boldsymbol{r})$ **analytically** — 2023.05

- test

**Complex Vector Linear** Fourier Crystal Optics — **Analytic solution** $\boldsymbol{E}(\boldsymbol{r})$ to $\left[(\nabla\times)^2 - k_0^2\bar{\bar{\varepsilon}}\cdot\right]\boldsymbol{E}(\boldsymbol{r}) = \boldsymbol{0}$ **where** $\varepsilon_{ij} \in \mathbb{C}$ — 2023.02

**Real Scalar Nonlinear** Fourier Crystal Optics — **Closed-form** $E_3(\boldsymbol{r})$ in $(\nabla^2 + k_3^2)E_3(\boldsymbol{r}) = -k_{03}^2\chi(\boldsymbol{r})E_1(\boldsymbol{r})E_2(\boldsymbol{r})$ — 2022.02

## Scientific Activities

- **Head Teaching Assistant** at University Name — Spring 2019
  *Course Name (COURSE CODE)*
- **Teaching Assistant** at University Name — Spring 2017
  *Course Name (COURSE CODE)*

## Academic Focus

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|---|---|---|
| | **Next generation** high N.A. 3D vector non-uniform analytic linear & nonlinear Fourier crystal optics | 2024.06 |
| !Paraxial $\boldsymbol{k}_0^{\omega}$ | **High N.A.** 3D vector non-uniform analytic linear & nonlinear Fourier crystal optics | 2024.03 |
| Emphasizing $\boldsymbol{G}_{\mathrm{xyz}}^{\omega}$ | **3D** vector non-uniform analytic linear & nonlinear Fourier crystal optics | 2023.12 |
| Involving $\bar{\bar{\chi}}_{\omega}^{(2)}$ anisotropy | **Vector** non-uniform analytic linear & nonlinear Fourier crystal optics | 2023.06 |
| !Unitary $\boldsymbol{G}_{\omega}^{\pm} \Leftarrow$ !Hermitian $\bar{\bar{\varepsilon}}_{\mathrm{r}}^{\omega} \Rightarrow$ | **Non-uniform** analytic linear & nonlinear Fourier crystal optics | 2023.03 |
| Solution $\boldsymbol{E}_{\omega}^{\pm}$ to $\left(\boldsymbol{\nabla}^2+k_{\omega\pm}^2\right)\boldsymbol{E}_{\omega}^{\pm} \propto \boldsymbol{P}_{\omega\pm}^{(2)}$ | **Analytic** linear & nonlinear Fourier crystal optics | 2022.09 |
| Solution $\mathcal{F}\left[E_3\right]=\mathcal{F}\left[f\left(\mathcal{F}^{-1}\left[\cdot\right]\right)\right]$ to the Eq. below | **Nonlinear** angular spectrum theory for SFG | 2022.06 |
| Solution $\mathcal{F}\left[E_3\right]=\iint\!\!\iint$ to $\left(\boldsymbol{\nabla}^2+k_3^2\right)E_3(\boldsymbol{r}) \propto P_3^{(2)}(\boldsymbol{r})$ | **Nonlinear** convolution solution to SFG | 2022.03 |
| Nonlinear THz $LiNbO_3$-based metasurface | **Quit THz project formally** \| COMSOL | 2022.01 |
| BWOPO + THz optical parametric amplification | Mathematica \| BookxNote Pro | 2021.12 |
| THz backward optical parametric oscillator (BWOPO) | Mathematica \| VBA Excel | 2021.11 |
| Multi-cycle THz orbital angular momentum (OAM) source | RoamEdit \| Blender | 2021.11 |
| Narrow-band THz OAM source via Optical Rectification (OR) | Python \| Blender | 2021.10 |
| Electricity $\xrightarrow{\text{produce}}$ Acoustics $\xrightarrow{\text{modulate}}$ Optics | RoamEdit \| VBA Excel | 2021.07 |
| Visible Photons $\xrightarrow{\text{SPDC}}$ THz Spectroscopy | BookxNote Pro \| GeoGebra \| VBA Excel | 2021.06 |
| Cavity Phase Matching = Sheet OPO | Paint 3D \| RoamEdit \| GeoGebra \| VBA Excel | 2021.05 |
| THz Holography via Optical Rectification | Matlab \| GeoGebra \| VBA Excel | 2021.01 |
| Femtosecond laser $\xrightarrow{\text{Optical Rectification}}$ Terahertz (THz) | GeoGebra \| VBA Excel | 2020.12 |
| Multicycle THz pulse generation by OR in $LiNbO_3$ ... crystals | VBA PowerPoinT | 2020.10 |

## Skills

- **Skill Group:** List of technologies
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- **Skill Group:** List of technologies

## Languages

- **Language:** language proficiency level
  - **EXAM:** details
- **Language:** language proficiency level
- **Language:** language proficiency level

## Honors & Awards

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|---|---|---|---|---|---|
| **Academia** | Doctor's Qualification Exam (Oral) | Excellent | *Top 15%* | Nanjing U. | 2024.01 |
| | Bachelar Dissertation & Defense | Excellent | *1/90* | Northeastern U. | 2020.06 |
| **Competition** | Three Provinces Achievement Expo | Exhibition | *Leader* | Three Prov. | 2019.10 |
| | "Challenge Cup" Tech Competition | Grand prize | *Leader* | Liaoning Prov. | 2019.06 |
| **Scholarships & Fellowships** | Academic Fellowship | 1st class | *¥40,000* | Nanjing U. | 2020-24 |
| | "Jinchuan" Scholarship | 1st place | *¥5,000* | Northeastern U. | 2019.04 |
| | Academic Scholarship | 1st place | *¥2,000* | Northeastern U. | 2018.06 |
| | Entrance Scholarship | 3rd place | *¥5,000* | Leshan No.1 H.S. | 2013.09 |
| **Honors & Titles** | Graduation with Honor | Outstanding | | Northeastern U. | 2020.07 |
| | League Member | Excellent | | Northeastern U. | 2019.11 |
| | Undergraduate Student | Excellent | | Northeastern U. | 2018.12 |
| **Memberships** | Chinese Society for Optical Engineering | Member | | Nanjing U. | 2021-25 |
| | "Qian Sanqiang" Talent Class | Head | | I.H.E.P. | 2017-20 |

## Extracurricular Activities

- Member at Some Club 2017–Current
  *Detailed explanation of what you do at this club*
- Member at Some Club 2016–2017
  *Detailed explanation of what you do at this club*
- Volunteer at Some Event Fall 2019
  *Detailed explanation of what you do in this event*
- Volunteer at Some Event Winter 2015
  *Detailed explanation of what you do in this event*