Postdoctoral research associate opening in Madison, WI

**Topic area:** Development of a new gas temperature imaging technique based on infrared lasers and computed tomography (CT)

**Research opportunity:** Novel CT techniques can reconstruct dynamic targets using a reduced number of views. These techniques can be combined with multispectral absorption spectroscopy to image gas temperature in dynamic environments.

**Duties:**
1. Simulate multispectral CT and subsequently optimize parameters to enable the construction of high-performance temperature imaging systems.
2. Manage tasks performed by undergraduate and graduate research assistants.
3. Contribute to drafting papers, proposals, and reports.

**Salary:** Commensurate with experience, $40,000 typical

**Start date:** As soon as possible

**Duration of the position:** 2 years typical, transition into a permanent scientist role is possible

**Benefits:** Excellent health insurance, regular vacation, unemployment benefits, bus pass, ...

**Tools:**
- novel CT methods
- advanced laser sources and optical access hardware
- new spectroscopic analysis approaches (e.g., § 3.4.2 of this thesis)

**Focus of this job opening:**
Evaluation and improvement of temperature imaging performance using:
- Numerical simulations
- Optimization

**Goal:**
4-D gas temperature imaging in practical devices:
- 3-D spatial at ~ 3 mm spatial resolution
- 1-D temporal at ~ 50 kHz rep rate

**Practical testing and constraints:**
- Controlled validation experiments
- layout of fiber-optic access
Qualifications: The ideal candidate would have strong experience with
- computational simulation of CT imaging and/or advanced image processing
- Fortran/C/C++/MATLAB
- optimization
- near-IR molecular spectroscopy
Candidates that have only cursory understanding of one or more of the above will be considered, provided an enthusiasm to learn.

Work environment: The successful applicant will interact with the research groups of Prof. Sanders and Prof. Chen. Snapshots of the two groups are given below:

<table>
<thead>
<tr>
<th></th>
<th>Sanders group</th>
<th>Chen group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>primary research area</strong></td>
<td>construction of custom multiwavelength sources, development of practical sensors based on H₂O absorption spectroscopy</td>
<td>CT image reconstruction, design and instrumentation of novel CT imaging systems, and advanced applications of CT imaging methods in medical and industrial applications</td>
</tr>
<tr>
<td>postdoctoral researchers / senior staff</td>
<td>none</td>
<td>2</td>
</tr>
<tr>
<td>graduate students</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>undergraduate researchers</td>
<td>5</td>
<td>none</td>
</tr>
</tbody>
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